2014-1775
(Reexamination Nos. 90/011,577 and 90/012,074)

United States Court of Appeals for the Federal Circuit

IN RE INTERVAL LICENSING LLC,

Appellant.

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board, in Reexamination Nos. 90/011,577 and 90/012,074.

BRIEF FOR APPELLANT INTERVAL LICENSING LLC

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November 10, 2014

CERTIFICATE OF INTEREST

Counsel for Appellant Interval Licensing LLC certifies the following:

1. The full name of every party or amicus represented by me is:

   Interval Licensing LLC

2. The name of the real party in interest represented by me is:

   Interval Licensing LLC

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party represented by me are:

   None

4. The names of all law firms and the partners or associates that appeared for the party now represented by me in the trial court or agency or are expected to appear in this court are:

   Patrick J. Finnan: Edell, Shapiro & Finnan LLC

   Nathan Davis, Michael Heim: Heim, Payne & Chorush LLP

   Justin A. Nelson: Susman Godfrey LLP.

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STATEMENT OF RELATED CASES

No other appeal in or from the same proceeding was previously before this Court or any other appellate court.

The patent that is the subject of this appeal was asserted in the following cases pending in the United States District Court for the Western District of Washington:

Interval Licensing LLC v. AOL, Inc., No. 2:10-cv-01385-MJP;

Interval Licensing LLC v. Apple, Inc., No. 2:11-cv-00708-MJP;

Interval Licensing LLC v. eBay, Inc., No. 2:11-cv-00709-MJP;

Interval Licensing LLC v. Facebook, Inc., No. 2:11-cv-00710-MJP;

Interval Licensing LLC v. Google, Inc., No. 2:11-cv-711-MJP;

Interval Licensing LLC v. Netflix, Inc., No. 2:11-cv-712-MJP;

Interval Licensing LLC v. Office Depot, Inc., No. 2:11-cv-713-MJP;

Interval Licensing LLC v. OfficeMax Inc., No. 2:11-cv-714-MJP;

Interval Licensing LLC v. Staples Inc., No. 2:11-cv-715-MJP;

Interval Licensing LLC v. Yahoo! Inc., No. 2:11-cv-716-MJP;

Interval Licensing LLC v. YouTube LLC, No. 2:11-cv-717-MJP;

Each of these cases will be affected by the outcome of this appeal.

Three other patents owned by Interval Licensing were also asserted in the cases listed above. Two of those patents are the subject of separate appeals that are currently pending before this Court:

Interval Licensing LLC v. AOL, Inc. (No. 13-1282) (Chen, J.);

Interval Licensing LLC v. Apple Inc. (No. 13-1283) (Chen, J.);

Interval Licensing LLC v. Google, Inc. (No. 13-1284) (Chen, J.);

Interval Licensing LLC v. Yahoo! Inc. (No. 13-1285) (Chen, J.).

These cases, however, will not directly affect or be directly affected by the Court's decision in this appeal because they relate to separate patents and there are no overlapping issues.

STATEMENT OF JURISDICTION

This appeal arises from an *ex parte* reexamination proceeding within the jurisdiction of the United States Patent and Trademark Office ("PTO"). *See* 35 U.S.C. §§ 302-305. Patent owner Interval Licensing LLC ("Interval") appealed the Examiner's final rejection of the claims at issue to the PTO Patent Trial and Appeal Board ("Board"), which had jurisdiction under 35 U.S.C. §§ 134(b) and 306. The Board issued its final order affirming the rejection on May 29, 2014. *See* A1-A22. Interval timely filed a notice of appeal from the Board's decision on July 29, 2014. *See* 35 U.S.C. §§ 141(b) and 142; 37 C.F.R. § 90.3(a)(1). This Court has jurisdiction under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. § 141.

STATEMENT OF THE ISSUES

(1) Whether the Board erred by adopting an unreasonably broad interpretation of the claim term "in response to" when affirming the Examiner's rejection of certain claims as unpatentable under 35 U.S.C. §§ 102(b) and 103(a) based on Joachims.

(2) Whether the Board's decision affirming the rejection of certain claims as unpatentable under 35 U.S.C. § 103(a) over Chesnais and Bender must be reversed because the Examiner and Board assumed without evidence (and contrary to Interval's evidence) that the claimed "comparing" step is met by Chesnais and that Chesnais' category-driven scheme could be modified in light of Bender.

(3) Whether the Board's informal comments in a footnote about Bender are based on an unreasonably broad claim construction and constitute a new ground of rejection that requires reopening prosecution.

(4) Whether the Board erred by affirming the Examiner's rejection of certain dependent claims without any discussion or analysis of the grounds on which they were rejected.

STATEMENT OF THE CASE

I. Interval Research Corporation & Interval Licensing LLC

The patented technology at issue in this appeal was developed at Interval Research Corporation ("Interval Research"), a privately funded think tank founded in 1992 by Paul Allen and David Liddle to perform advanced research and development in the areas of information systems, communications, and computer science. Mr. Allen, who served as Interval Research's chairman, is the co-founder of Microsoft Corp. and one of the earliest pioneers of personal computer software. Mr. Liddle, who served as Interval Research's president and chief executive officer, is a veteran of Xerox's innovative Palo Alto Research Center. Messrs. Allen and Liddle worked together to build Interval Research into a preeminent technology firm that employed over 110 of the world's leading scientists, physicists, and engineers.

Interval Research sought to be at the forefront of designing innovative, next-generation technology. It was successful in this regard, pioneering a large number of groundbreaking technologies and—after only one decade in existence—earning three hundred issued patents or pending applications. Despite its accomplishments, Interval Research did not succeed commercially. In 2000, Interval Research laid off the bulk of its staff and, in 2004, it dissolved.

Interval Research transferred ownership of the two patents at issue in this appeal to Interval Licensing LLC, the Appellant in this case. Interval Licensing is a sister company to Vulcan Inc., which is the corporation that was founded by Mr. Allen to manage his business and charitable endeavors. Vulcan Inc. and Interval Licensing have sought to protect, enforce, and monetize Interval Research's patent rights by selling, licensing, or litigating the patents in its portfolio.

II. The '507 Patent

U.S. Patent No. 6,263,507 ("the '507 patent") describes a way to make a large collection of information more useful by acquiring, organizing, correlating, and displaying different pieces of information (*e.g.*, video, image, audio, or text data) from within the collection. '507 patent at 2:60-66, 3:17-22, 3:34-59 (A37-A38).

The preferred embodiment described in the patent is a "news browser" that obtains news stories from television and online text-based sources. *Id.* at 3:8-14, 19:59-22:11 (A38, A46-A47). The news browser then analyzes the news information to determine whether certain items such as articles or video clips (referred to as "segments") are related to each other. *Id.* at 3:34-43, 27:40-29:43 (A38, A50-A51). The news browser determines the relatedness of segments by direct comparison of the content of the two segments. *Id.* at 28:36-29:3 (A50-A51). For two text-based news stories, for example, the comparison may be performed on the text of the articles themselves. If one of the segments to be

compared is a video (*e.g.*, a clip from the local television news), the specification describes using speech recognition or closed-caption information to generate textual information that can then be directly compared to the textual information of another segment. *Id.* at 28:15-19 (A50).

The ’507 patent’s approach of segment-to-segment comparisons stands in contrast to other information navigation systems, which were based on the concept of organizing information according to pre-defined subject matter categories. Those systems provided a user interface that allowed the user to select a category, which then caused the system to present information that had been pre-determined to relate to the topic of the category. *See, e.g.*, A128-A135 (describing Chesnais). In such systems, rather than comparing segments of information to other segments of information, each segment was instead considered individually and associated with one or more categories.

The ’507 patent also explains how to display the information to enable the user to quickly identify and navigate to related information. The specification describes that while a user watches a television news story, for example, the invention can automatically identify and display portions of text articles (*e.g.*, headlines or text excerpts) relating to that television clip. ’507 patent at 3:43-54, 5:36-42, 10:14-16, 16:55-17:4 (A38, A39, A41, A44-A45). The ‘507 patent further describes how the invention can enable the user to select the displayed portion of the second segment (*e.g.*, the headline or text excerpt of a news article)

in order to cause the full second segment (*i.e.*, the entire news article) to be displayed. *Id.* at 5:28-31, 18:45-51 (A39, A45).

In this manner, the ’507 patent invention enables “realtime display of some or all of a body of information while also displaying related information in response to the real-time display.” *Id.* at 4:34-37 (A38). The background section of the ’507 patent specification explains that this manner of display offered an additional improvement over previously known information navigation systems, which “do not enable the real-time display of some or all of a body information while also displaying related information in response to the real-time display." *Id.* at 2:49-52 (A37).

Claims 20-24, 27, 28, 31, 34, 37, 38, 63-67, 70, 71, 74, 77, 80, 81, and 130-188 are at issue in this appeal. Claims 20 and 63 are the independent claims. Independent method claim 20 recites:

> 20. A method for acquiring and reviewing a body of information, wherein the body of information includes a plurality of segments, each segment representing a defined set of information in the body of information, the method comprising the steps of:
>
> acquiring data representing the body of information;
>
> storing the acquired data;
>
> generating a display of a first segment of the body of information from data that is part of the stored data;
>
> comparing data representing a segment of the body of information to data representing a different segment of the body

> of information to determine whether, according to one or more predetermined criteria, the compared segments are related; and
>
> generating a display of a portion of, or a representation of, a second segment of the body of information from data that is part of the stored data,
>
> wherein the display of the portion or representation of the second segment is generated in response to the display of a first segment to which the second segment is related.

Id. at 38:37-57 (A55). Independent claim 63 recites a computer readable medium containing instructions for performing the steps recited in claim 20. *Id.* at 43:60-44:16 (A58). Two dependent claims add limitations that require an ability to navigate through the information system by selecting the displayed portion or representation of the second segment in order to cause the display of the entire second segment. *Id.* at 39:4-8 (claim 23), 44:33-37 (claim 63) (A56, 58).

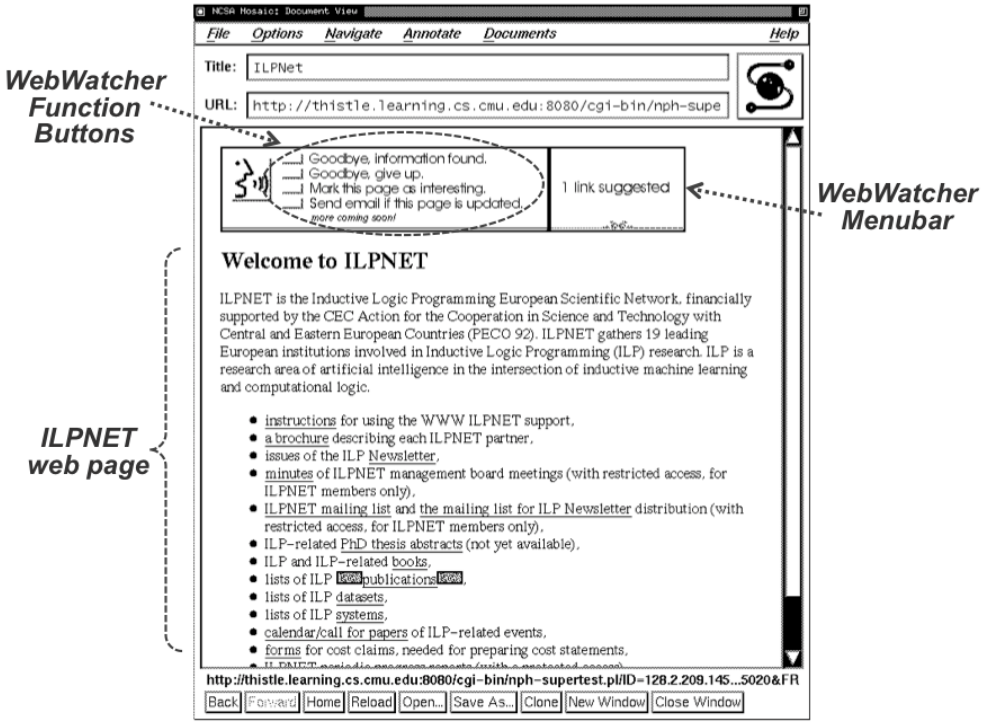
III. The Cited References

Three references are the focus of this appeal:

1. Joachims et al., "WebWatcher: Machine Learning and Hypertext" (hereinafter, "Joachims") (A190-A194);
2. Chesnais et al., "The Fishwrap Personalized News System" (hereinafter, "Chesnais") (A128-A135);
3. Bender et al., "Network Plus" (hereinafter, "Bender") (A109-A118).

A. Joachims

The Joachims article describes a browser agent called "WebWatcher," which a user can interact with in order to obtain assistance while browsing the World Wide Web. A190, A194; A1857-1858 at ¶ 23. When a user activates the WebWatcher system on a particular web page, WebWatcher "inserts a menubar on top of the original page. This menubar allows the user to invoke additional functions of WebWatcher or to terminate the search." A190. The WebWatcher menubar as displayed on an exemplary web page ("ILPNET") is depicted in Figure 4 of Joachims, which is reproduced below with explanatory annotations added in italics, and a dashed oval encircling the various WebWatcher function buttons in the menubar:



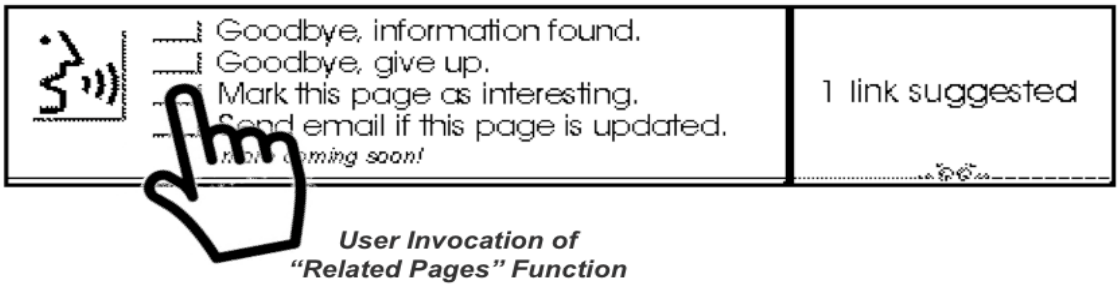
A191 (annotations added).

When the user is viewing the displayed web page, WebWatcher does not perform any actions unless explicitly invoked by the user via the user clicking on one of the WebWatcher function buttons on the menubar. A1857-1858 at ¶¶ 23, 25. One of the function buttons, labeled "Mark this page as interesting," allows the user to invoke WebWatcher's "function to find related web pages":

> An example of the use of this functionality is given in figures 4 and 5. In figure 4 the user is at the "Welcome to ILPNET" page, clicks on the button "*Mark this page as interesting*", and is next presented with the screen depicted in figure 5, which suggests related web pages.

A192.

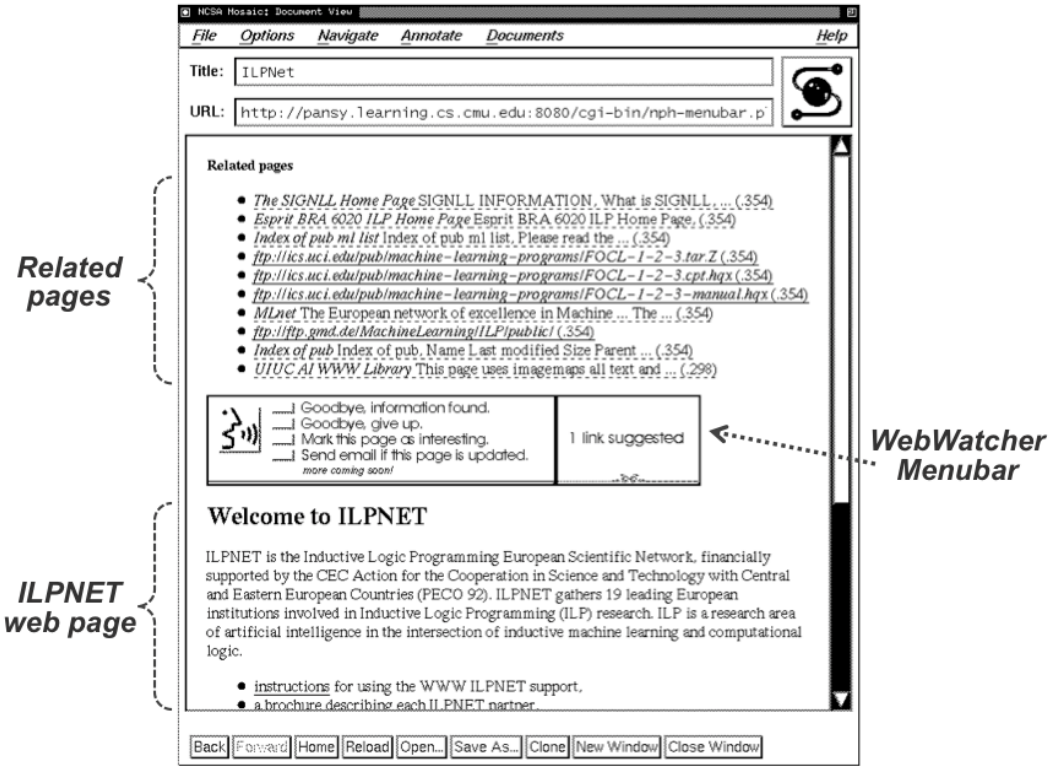
An enlarged view of the WebWatcher menubar from Figure 4 is depicted below, and has been annotated with a hand icon illustrating the user's explicit invocation of the "function to find related web pages" via clicking on the "*Mark this page as interesting*" button in the menubar:



See A191 (annotations added).

WebWatcher responds to the user's request by displaying a list of hyperlinks to related web pages above the menubar. A1858 at ¶ 24. This is shown in Figure 5

of Joachims, which is reproduced below with explanatory annotations added in italics.



A192 (annotations added).

In this manner, the WebWatcher system displays a first webpage (*e.g.*, the ILPNET page) and a menubar and waits for input from the user. Nothing further is displayed unless and until the user makes a specific selection from the menubar. A1858 at ¶ 24.

B. Chesnais

Chesnais discloses a personalized online newspaper system called Fishwrap, which assembles a customized newspaper for a user based on the user's

identification of topics of interest. A128. News articles received by Fishwrap are sorted into topic categories by comparing keyword "signatures" associated with the articles to specific words that define each of the topic categories. A131-A132; A1855 at ¶ 16. Fishwrap can receive photographs and sound recordings along with an article, and stores the photographs and sound recordings such that they are linked to the accompanying article (*e.g.*, by using HTML tags). A130-A132.

Each user provides a profile of topics of interest that is used to select articles to present to the user. A128. When Fishwrap generates a personalized news presentation for the user, an article is retrieved if it matches one of the user's topics of interest. A130. Specifically, Fishwrap first displays a table of contents that lists news categories tailored to the user's profile. A129. When the user selects a particular news category, he is presented with a topic page containing summaries of articles within that topic category. A128-A129. The user can expand a particular article summary by clicking on it. *Id.* When Fishwrap displays a full article, it "also checks its photo and audio databases to see if there are photos and sound recordings that match the story." A130. Chesnais does not elaborate on what is meant by a "match" to the story but provides context suggesting this refers simply to retrieval of a photo or sound recording that was received as a package with a specific news story, in order to present the photo or sound recording with its news story. A132. From the article, the user can view other articles in the same

topic category or return to the table of contents, but cannot otherwise navigate through Fishwrap's stored information.

C. Bender

Bender's Network Plus system proposes a way to repackage a live television broadcast, such as the evening news, to also include text news stories alongside the original broadcast. A113, A117-A118. In the example shown in Figure 2, which is reproduced below with explanatory annotations added in italics, the television display is divided into three sections. The news broadcast is displayed in the lower right quadrant of the screen, a video still extracted from the broadcast is shown in the upper right quadrant of the screen, and the full text of a related news wire story is displayed on the left half of the screen. A113-A114.

Figure 2: Network Plus. The live broadcast is in the lower right quadrant. Salient stills are in the upper right. Text from the wire services is on the left.

See A117 (annotations added).

News wire stories are correlated to the telecast using a keyword matching scheme that searches for common words in the closed captioning transcript and the

text of the news wire stories. A114. Because Bender is describing a video broadcast that would be displayed on a television, it does not describe any features that would enable a user to control his experience or navigate through the displayed information.

IV. Proceedings before the PTO

Requests for *ex parte* reexamination of claims 20-24, 27, 28, 31, 34, 37, 38, 63-67, 70, 71, 74, 77, 80, 81, and 130-188 of the '507 patent were filed on March 17, 2011 (Control No. 90/011,577) and December 28, 2011 (Control No. 90/012,074). The two proceedings were subsequently merged. The requests proposed grounds of rejection based on four primary references: Reilly, Bender, Chesnais, and Joachims.

One of the key limitations relied upon by Interval to distinguish the prior art was the requirement in each claim (via independent claims 20 and 63) that "the display of the portion or representation of the second segment is generated *in response to* the display of a first segment to which the second segment is related." (Emphasis added). Interval argued that this limitation required automatic display without the requirement of intervening user action. A768-A771, A2023-A2025. The Examiner disagreed, concluding that Joachims satisfied the "in response to" limitation because it disclosed displaying a list of webpages (*i.e.*, the claimed "portion or representation of the second segment") that were "closely related" to

the ILPNET webpage being displayed (*i.e.*, the claimed "first segment") even though an intervening user action was required before the display would be generated. A648-A649, A1061, A1943-A1944.

With respect to Chesnais, Interval argued that it only used topic categories to determine which articles were displayed to the user and did not use the segment-to-segment comparison recited in the claims. The Examiner disagreed again and alleged that Chesnais disclosed that photos and sound recordings have "signatures" that can be compared to "signatures" of news stories. A618-A621, A1031-A1034, A1911-A1914. Although Interval submitted an expert declaration explaining that the Examiner had misunderstood what was being described in Chesnais and that no segment-to-segment comparisons occurred (A1855-A1857), the Examiner nevertheless concluded that Chesnais satisfied the "comparing" limitation. A1204-A1209, A1982-A1984.

Interval distinguished Bender on the grounds that the Network Plus system displayed complete new stories rather than a "portion or representation" of the second segment as recited in the claims. A2026-A2027, A2062-A2064. This key difference between Bender and the invention of the '507 patent flows from the fact that Bender is describing a television broadcast that does not permit the user to interact with or navigate through the news stories. Without squarely addressing Interval's claim construction arguments or the claim mapping in the adopted

grounds of rejection, the Examiner maintained the Bender rejections based on mappings of the claim requirements onto Bender that were inconsistent with the adopted grounds of rejection. A1222-A1229, A1460-A1466.

Interval appealed the Examiner's final rejections to the Board. In its decision, the Board primarily considered the rejections based on Joachims. The Board affirmed the rejection of independent clams 20 and 63 and certain dependent claims as anticipated by Joachims under 35 U.S.C. § 102(b) and also affirmed rejections of additional dependent claims as unpatentable under 35 U.S.C. § 103(a) over Joachims in view of a number of secondary references. A10-A19. When addressing the key question of how "in response to" should be construed, the Board agreed with the Examiner that Joachim's display of related webpage links that occurred only after a user clicked a menu button were nevertheless displayed "in response to" the display of the primary webpage being viewed. A10-A13.

Because the Examiner did not include dependent claims 38 and 81 in a rejection based on Joachims, the Board briefly considered and affirmed the Examiner's rejection of claims 20-24, 27, 31, 34, 37, 38, 63-67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over the combination of Chesnais and Bender. The Board affirmed the Examiner's conclusion that it would have been obvious to combine the teachings of Chesnais and Bender "to identify matching photos and sound recordings," but did not address the factual disputes about

Chesnais' disclosure or Interval's principal arguments that Chesnais' photos and sound recordings do not have "signatures" for comparison and segment-to-segment comparisons (such as those of Bender) are unsuitable for Chesnais' category-driven scheme. A19-A21.

The Board opted not to reach the rejections of the claims that relied on Bender or Reilly as the primary reference or the remaining rejections relying on Chesnais as the primary reference. A19. The Board nevertheless commented on Bender as a primary reference in a footnote and expressed its view that the claim limitations in question were met by Bender. A21 n.3. In doing so, the Board advanced its own new theory of how to map Bender's disclosure to the claim and failed to address Interval's claim construction argument. *Id.*

The Board ultimately affirmed the Examiner's decision to reject all of the claims at issue in the reexamination. A22. In doing so, the Board affirmed rejections of many claims that were not covered by any of the grounds of rejections that the Board actually reviewed, including claims 130, 132, 134-136, 139-141, 152, 157-162, 164, 166-171, 180, and 185-187.

SUMMARY OF THE ARGUMENT

The Board's decision affirming the claim rejections based on Joachims rests on a flawed interpretation of the claim term "in response to." Even under the broadest reasonable interpretation standard, the meaning of "in response to" requires a cause-and-effect relationship between two events, where one event occurs in reaction to and as a consequence of the other event rather than in response to a different, intervening event or action. One event does not occur "in response to" another event merely because there is some relationship or connection between them, as the Board held. In the Joachims system, an intervening user action (clicking a button on a menu) is entirely responsible for the display of the related webpage links (mapped to the claimed "portion or representation of the second segment"). Because that display does not occur "in response to" the display of the primary webpage (mapped to the claimed "first segment"), Joachims cannot anticipate.

Second, the Board erred in affirming the rejection based on Chesnais and Bender because the claim requirement of comparing data representing one segment to data representing a different segment to determine whether the segments are related is not met by Chesnais, and it would not have been obvious to modify Chesnais to incorporate the claimed segment-to-segment comparison in view of the teachings of Bender. Chesnais' system is based on the principle of organizing and

presenting online news articles according to topic categories. Irrespective of whether Bender establishes the feasibility of segment-to-segment comparison, within Chesnais' category-driven scheme, there is no need for comparing articles to articles. However, to create such a need in order to justify combining the references, the Examiner and Board assumed without evidence—and contrary to the evidence presented by Interval—that Chesnais compared news articles to photographs and sound recordings on a segment-to-segment basis. Because the Board's factual findings are unsupported by evidence, the obviousness rejections must be reversed.

While opting not to formally address the rejections based on Bender as a primary reference, the Board nevertheless expressed its opinion that the claims are not patentable over Bender. In doing so, the Board failed to address Interval's argument that Bender did not disclose the claimed display of a "portion or representation of the second segment." Moreover, the Board's analysis was inconsistent with the Examiner's basis of the rejections, which set forth a different mapping of the claim elements to the teaching of Bender. In the interest of avoiding a likely second appeal, Interval respectfully requests that the Court review these issues as well.

Finally, the Board erroneously affirmed the Examiner's rejections of many dependent claims without actually reviewing any of the grounds upon which those claims were rejected.

ARGUMENT

I. Standard of Review

This Court "review[s] the Board's factual findings for substantial evidence and its legal conclusions *de novo*." *Rambus Inc. v. Rea*, 731 F.3d 1248, 1251 (Fed. Cir. 2013).

"During reexamination, as with original examination, the PTO must give claims their broadest reasonable construction consistent with the specification." *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007). The broadest reasonable construction rule, however, is not "an unfettered license to interpret claims to embrace anything remotely related to the claimed invention." *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010). "The protocol of giving claims their broadest reasonable interpretation during examination does not include giving claims a legally incorrect interpretation." *In re Skvorecz*, 580 F.3d 1262, 1267 (Fed. Cir. 2009). "Although the PTO gives claims the broadest reasonable interpretation consistent with the written description, claim construction by the PTO is a question of law that we review *de novo* . . . ." *In re Baker Hughes Inc.*, 215 F.3d 1297, 1301 (Fed. Cir. 2000) (citations omitted).

"Determining whether claims are anticipated involves a two-step analysis. The first step involves construction of the claims of the patent at issue[,] . . . a question of law reviewed *de novo*[,] . . . The second step of an anticipation analysis involves comparing the claims to the prior art[,] . . . a question of fact reviewed for substantial evidence." *In re Montgomery,* 677 F.3d 1375, 1379 (Fed. Cir. 2012) (internal citations and quotation marks omitted).

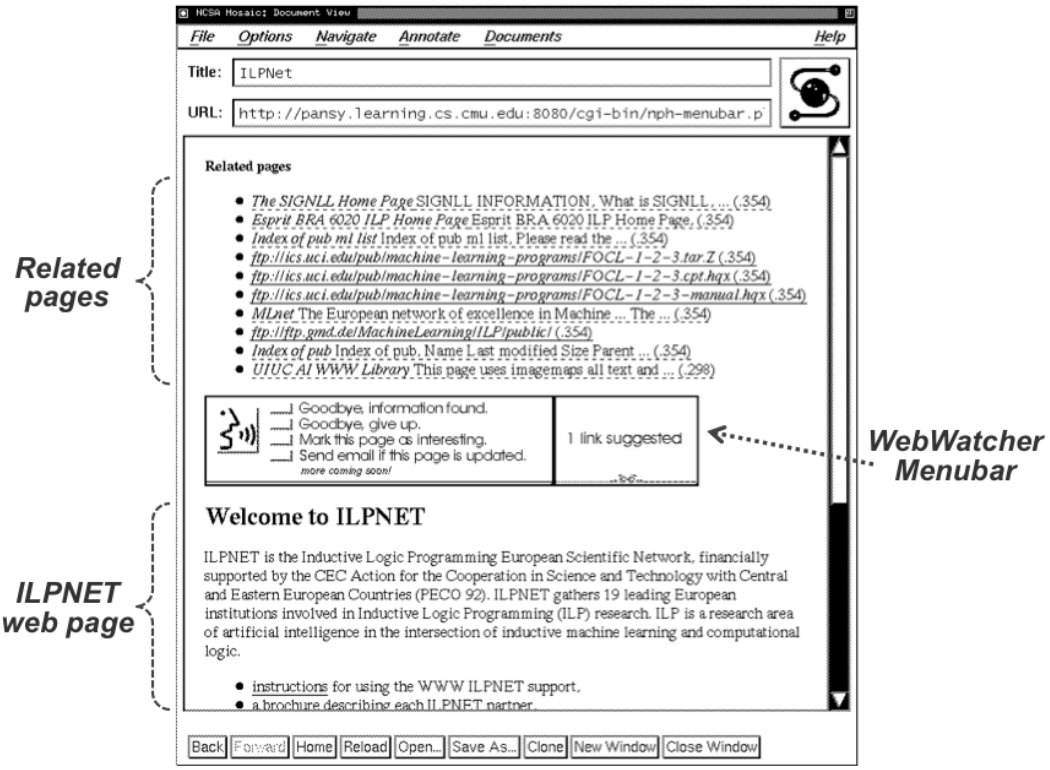
"Obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective considerations of nonobviousness." *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068 (Fed. Cir. 2012) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)).

Whether the Board relied on a new ground of rejection is a legal question that is reviewed *de novo. In re Stepan Co.,* 660 F.3d 1341, 1343 (Fed. Cir. 2011).

II. The Board Incorrectly Affirmed The Examiner's Rejections Based On Joachims

Each of the claims at issue in this appeal contains a limitation specifying that "the display of the portion or representation of the second segment is generated in response to the display of a first segment to which the second segment is related." '507 patent at 38:53-57 (independent claim 20), 44:13-16 (independent claim 63) (A55, A58).

When addressing Joachims, the Examiner and Board mapped the claimed "first segment" to the ILPNET webpage that the user visited and the claimed "portion or representation of the second segment" to the related webpage links generated by WebWatcher and displayed above the webpage and the WebWatcher interface:



See A192 (annotations added).

In Joachims the webpage links will not be displayed unless the user takes the intervening action of clicking on the "Mark this page as interesting" menu button in the WebWatcher interface. A1857-A1858 at ¶¶ 23, 25. Therefore, the display of the related webpage links occurs not in response to the display of the primary

webpage being viewed (ILPNET in the figure above) but in response to the user clicking the "Mark this page as interesting" button.

The Examiner nevertheless concluded that Joachims disclosed displaying the webpage links "in response to" the display of the primary webpage because they were "closely related." *See* A1061-1062; A1214-A1215. The Board affirmed, explaining that under the "broadest reasonable interpretation" rule, Joachims disclosed that the "second portion [*i.e.*, a related webpage link] is identified and displayed in response to the display of the first page [*i.e.*, the ILPNET webpage] in that it is identified and displayed *because it is related to the first segment* [*i.e.*, the ILPNET webpage]." A12-A13 (emphasis added).

The interpretation of "in response to" adopted by the Examiner and Board that extends to any "related" display is unreasonably broad in light of the plain meaning of the phrase "in response to" and the teaching of the '507 patent specification. Under the correct construction, Joachims does not anticipate and, accordingly, the rejections based on Joachims must be reversed. *See Skvorecz*, 580 F.3d at 1267-68 (reversing anticipation rejection premised on incorrect claim construction).

A. The Ordinary Meaning Of "In Response To" Requires A Cause-And-Effect Relationship

The ordinary meaning of the words "in response to" requires a cause-and-effect relationship in which one event occurs in reaction to or as a result of another

event. This Court has previously recognized this ordinary meaning, noting that "'[i]n response to' connotes that the second event occur *in reaction to* the first event." *Am. Calcar, Inc. v. Am. Honda Motor Co.*, 651 F.3d 1318, 1340 (Fed. Cir. 2011) (emphasis added); *see also id.* ("[T]he court properly construed the claim terms 'in response to' and 'when' to require a cause-and-effect relationship."); *Fujitsu Ltd. v. Belkin Int'l, Inc.*, No. 10-cv-03972, 2012 U.S. Dist. LEXIS 142102, at *87-90 (N.D. Cal. Sept. 28, 2012) (construing "in response to" to require "a cause-and-effect relationship"). An event does not occur "in response to" another event merely because it occurs after that event or is in some way related to it. *See Fujitsu*, 2012 U.S. Dist. LEXIS 142102 at *88 (rejecting construction of "in response to" that meant "after").

The facts and holding of *American Calcar* are particularly instructive for the present dispute because it squarely addressed the pertinent issue here: whether a second event that can only be caused by intervening user action nevertheless occurs "in response to" a related preceding event. The patent in *American Calcar* related to an onboard-vehicle system that identified a service provider when it determined that the vehicle needed service. *Am. Calcar*, 651 F.3d at 1324. Claim 1 recited in relevant part:

> a processing element for determining based on the at least one measure a vehicle condition for which a selected service of the vehicle is needed, the processing element identifying one of the plurality of providers *in response to* the vehicle condition.

Id. (emphasis in original). The issue presented was whether the term "in response to" should be read to cover a vehicle system that identified a service provider only after a user request asking the system to find a service provider. *Id.* at 1339. The district court granted summary judgment of non-infringement and this Court affirmed because the "in response to" language was not met if an intervening user request was necessary. *Id.* at 1329, 1340.

Although *American Calcar* is directly on point, the Board dismissed it as "not hav[ing] direct bearing on the [present] case" because the Examiner and Board were applying the "broadest reasonable interpretation" standard and part of the Court's analysis in *American Calcar* was based on the intrinsic record of the patent at issue in that case. A12. The "broadest reasonable interpretation" rule, however, is not a license to ignore the ordinary meaning of the words in the claim. *Skvorecz*, 580 F.3d at 1267 ("The protocol of giving claims their broadest reasonable interpretation during examination does not include giving claims a legally incorrect interpretation."). *American Calcar* held that the ordinary meaning of "in response to" connoted a "reaction" or "cause-and-effect" relationship. *See* 651 F.3d at 1340. It was error for the Board to decline to apply that ordinary meaning.

B. The Written Description Describes A Cause-And-Effect Relationship Without The Necessity Of Intervening User Action

The '507 patent specification reinforces that the broadest reasonable interpretation of the term "in response to" requires a direct cause-and-effect relationship, consistent with the ordinary meaning. The specification frames the invention as a solution to the shortcomings of previous navigation systems that "do not *automatically* display such related segments of information" and "do not enable the *real-time* display of some or all of a body of information while also displaying related information in response to the real-time display." '507 patent at 1:41-45, 2:49-52 (A37) (emphases added).

The specification emphasizes the "automatic" manner in which the information is displayed. For example, it describes the "automatic identification of information that is related to information that is being displayed, so that the related information can be observed" and explains that this display of a portion or representation of the second segment occurs "in response to (e.g., simultaneous with)" the display of a related first segment. *Id.* at 3:33-54 (A38). It further describes how the portion or representation of the second segment is displayed "substantially coextensive in time" with the display of the related first segment. *Id.* at 5:10-17; 10:14-16 (A39, A41); *see also id.* at 4:34-47 (A38) ("The invention also enables the realtime display of some or all of a body of information while also displaying related information in response to the real-time display."). And it

explains that "[a]s the segment of primary information being displayed changes, the secondary information displays 204a, 204b typically change as well." *Id.* at 19:2-4 (A46). The fact that the related information sections of the described user interface change as the segment of primary information changes highlights the direct cause-and-effect relationship between the displays. *Id.* at 18:53-19:4 (A46-A47).

The Board set aside the bulk of the teaching of the specification based on a single sentence that mentions a possible alternative implementation that would require interaction with a menu to toggle on and off "related secondary information region 204" of the user interface shown in Fig. 2. A11-A12 (citing '507 patent at 14:60-63). This was improper for several reasons.

First, the cited sentence says that "a GUI [graphic user interface] according to the invention could be implemented such that a display of the *related secondary information region 204* is produced only upon appropriate interaction with one or more menus and/or dialog boxes." '507 patent at 14:60-63 (A43) (emphasis added). When considering the import of this sentence, it is critical to recognize that in the particular embodiment being described, the display of the "first segment" recited in the claims occurs on one display device (television 102 in Figure 1) while the "portions or representations of second segments" recited in the claims are displayed on a second and separate display device (control device 101 in

Figure 1 including the graphical user interface described in Figure 2). *See id.* at 10:30-40 (A41). In this embodiment, there are *two* regions of the user interface on control device 101 that may *each* independently display information mapping to the "portion or representation of the second segment" recited in the claims: (1) "related primary information 203"; and (2) "related secondary information region 204." *Id.* at 14:38-41 (A43); *see also id.* at 16:55-59, 18:52-56 (A44, A45). The sentence relied upon by the Board merely states that the "related secondary information region 204"—in other words, just *one* of the *two* regions for displaying portions of related segments—may be turned on or off by the user. Properly understood, this sentence does not mean that an intervening user action may be required when displaying the related information "in response to" the primary display. It simply means that the user can choose to turn off one of the two display regions for related information if both are not needed. Even when the "related secondary information region 204" is turned off by the user, the other region will still display the "portion or representation of the second segment" "in response to" the primary display. *See, e.g.*, *id*. at 16:56-64 (A44). Accordingly, the described embodiment will practice the "in response to" limitation irrespective of the presence or absence of user intervention.

Second, even if that sentence was describing an embodiment where the display of related information was always triggered by user selection of a menu or

dialog box, it still does not mean that such an embodiment would satisfy the "in response to" limitation of independent claims 20 and 63. *See Baran v. Med. Device Techs., Inc.*, 616 F.3d 1309, 1316 (Fed. Cir. 2010) ("It is not necessary that each claim read on every embodiment."). The phrase "in response to" does not appear in the sentence cited by the Board or in any of the surrounding paragraphs.

Finally, other claims in the '507 patent confirm the difference between displaying information in response to a display and displaying information in response to a user instruction. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (*en banc*) ("Differences among claims can also be a useful guide in understanding the meaning of particular claim terms."). For example, dependent claim 34 requires "identifying an instruction from a user to begin displaying at least some of the body of information, wherein the display of a first segment is begun *in response to* the user instruction." '507 patent at 40:10-14 (emphasis added) (A56).

C. The Board's Decision Affirming The Examiner's Rejections Based On Joachims Must Be Reversed

The ordinary meaning of "in response to" requires a cause-and-effect relationship that is not dependent on other intervening user activities, and this meaning is confirmed by the specification and other claims of the '507 patent. As explained above, Joachims does not display the WebWatcher related webpage links unless and until the user clicks the "Mark this page as interesting" menu

button. In other words, the Joachims display of related webpage links occurs "in response to" user selection of a menu button, not "in response to" the display of the primary webpage (*e.g.*, the ILPNET in the exemplary Figure 4) as the claims would require. *See* A191.

Accordingly, the Board's conclusion that Joachim satisfies the claim limitation requiring that "the display of the portion or representation of the second segment is generated in response to the display of a first segment to which the second segment is related" is erroneous. It follows that the Board's affirmance of the Examiner's final rejection under 35 U.S.C § 102(b) of claims 20 through 24, 31, 34, 37, 63 through 67, 74, 77, and 80, each of which contains this limitation (either itself or via dependency), must be reversed. *See* A10-13; *see Skvorecz*, 580 F.3d at 1267-68 (reversing anticipation rejection premised on incorrect claim construction). The Board's affirmance of the Examiner's final rejections of certain dependent claims under 35 U.S.C. § 103(a) based on Joachims in combination with various secondary references must also be reversed because those rejections were based on the erroneous premise that Joachims disclosed the "in response to" limitation and anticipated the independent claims. *See* A13-19; *In re Eaton*, 545 Fed. Appx. 994, 998-99 (Fed. Cir. 2013) (non-precedential) ("[S]ubstantial evidence cannot support a finding that Jungkeit met the 'essentially free of antioxidants' element. . . . [T]he Board's factual error regarding the amount of

antioxidant present in Jungkeit [also] taints its obviousness conclusion. . . . [T]his court reverses the Board's anticipation and obviousness determinations.")

III. The Board Incorrectly Affirmed The Examiner's Rejections Based On Chesnais and Bender

Each of the claims at issue in this appeal requires "comparing data representing *a segment* of the body of information to data representing *a different segment* of the body of information to determine, whether … the compared segments are related." '507 patent at 38:47-51 (independent claim 20, emphasis added) (A55); *id.* at 44:5-9 (independent claim 63, emphasis added) (A58). The Examiner found that Chesnais disclosed segment-to-segment comparisons or, in the alternative, modifying Chesnais to perform such comparisons would have been obvious in light of Bender. Neither finding is supported by the evidence.

A. Chesnais Does Not Disclose Segment-to-Segment Comparisons

The rejection based on Chesnais and Bender adopted by the Examiner and affirmed by the Board mapped the claimed "first segment" to a news article selected for display and the claimed "portion or representation of the second segment" to the photos or sound recordings linked to the news story. A1031, A2121; A20. Based on this mapping, the Examiner found that the "comparing" limitation was disclosed by the following passage in Chesnais: "Fishwrap also checks its photo and audio databases to see if there are photos and sound recordings that match the story." A1031; *see also* A130. The Examiner

interpreted this sentence to mean that keyword "signatures" associated with news stories are compared to keyword "signatures" associated with photos and sound recordings to determine whether they are related. A1031-A1034.

Interval explained in an expert declaration that the Examiner's assumptions were factually unsupported and unsound. Chesnais contains no disclosure or suggestion that photos and sound recordings have "signatures" at all, much less that such "signatures" could be compared to related news stories. A1855 at ¶ 15, A1857 at ¶¶ 20, 21. The keyword "signatures" described in Chesnais are associated exclusively with news articles and are created from the text of the news stories. A1855-A1856 at ¶¶ 16, 17.

Even in the context of news articles, the article "signatures" are never compared to other "signatures." A1856 at ¶¶ 18, 19. Instead, they are used to sort received articles into different topic categories. A1855-A1856 at ¶¶ 17-19; A131. The manner in which these signatures are created, the nature of their content, and their use exclusively for categorization of articles belies the unsupported assertion that photos and sound recordings possess such "signatures" and that such "signatures" are compared to "signatures" of news stories to establish relatedness. A1855-A1857 at ¶¶ 16-21.

Chesnais does not elaborate on the meaning of the passage about checking for photos and sound recordings that "match" a news story, and no evidence was

presented by the Examiner supporting its finding that a claimed segment-to-segment comparison using "signatures" was being described. A1855-A1857 at ¶¶ 15, 17-20. In contrast, Interval submitted an expert declaration that explains based on the disclosure of Chesnais that the photos and sound recordings are received as a package with specific news articles and are therefore linked to those articles without any need for comparison. A1857 at ¶ 20; A2284; *see also* A132 (Chesnais explaining that it can "accept items with graphics, audio, text, and motion pictures"). The passage relied upon by the Examiner, therefore, is simply referring to the retrieval of photos and sound recordings that came with the news story that has been selected for display—a process that would not involve any segment-to-segment comparisons. A1857 at ¶¶ 20-21.

Simply put, there is no evidence that Chesnais performs the claimed segment-to-segment comparison, either between two news articles or between a news article and a photo or sound recording. Without addressing Interval's arguments about the lack of evidentiary support underlying the Examiner's assumptions about how the Chesnais system operated, the Board adopted the Examiner's factual conclusions that "Chesnais discloses that each item in the system [*i.e.*, articles, photos, and audio] is assigned a 'signature' that includes keywords" and that those of skill in the art would be motivated to combine

Chesnais and Bender in order to "identify matching photos and sound recordings." A20.

It was error for the Examiner and Board to disregard Interval's evidence and simply assume that Chesnais operates in this way without any disclosure or evidence to support it. *See Astra Aktiebolag v. Andrx Pharms., Inc.*, 483 F.3d 1364, 1378 (Fed. Cir. 2007) ("[W]hen a claim limitation is not explicitly set forth in a reference, evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. . . . [I]t is not sufficient if a material element or limitation is merely probably or possibly present in the prior art."); *In re Sullivan*, 498 F.3d 1345, 1351 (Fed. Cir. 2007) ("When a patent applicant puts forth rebuttal evidence, the Board must consider that evidence."); *see also In re Lee*, 277 F.3d 1338, 1343-44 (Fed. Cir. 2002) ("The factual inquiry whether to combine references must be thorough and searching. It must be based on objective evidence of record." (quotation marks omitted)).

Because this erroneous factual finding was the basis on which the Examiner and Board concluded that there was a reason to combine Chesnais with Bender, the obviousness rejections must be reversed. *See In re Huai-Hung Kao*, 639 F.3d 1057, 1065-1066 (Fed. Cir. 2011) ("[T]he Board relied on erroneous reasoning in making the factual determinations that underlie its conclusion that claim 1 is

obvious, and that its factual findings are therefore unsupported by substantial evidence. . . . [T]he Board's determination will be vacated and remanded.").

B. It Would Not Be Obvious To Modify Chesnais in View of Bender To Use Segment-By-Segment Comparisons

The foundation of the Examiner's obviousness rejection was that "one of skill in the art would have been motivated to combine Bender's keyword matching scheme with the disclosure of Chesnais to identify matching photos and sound recordings." A20 (quoting Examiner). As explained above, Chesnais discloses that photos and sound recordings are displayed along with the article with which they came packaged, and it does not contemplate or suggest that the photos and sound recordings accompanying one article would need to be compared to *other* articles.

Moreover, although Bender discloses segment-to-segment comparisons (*i.e.*, comparing closed captioning text from a television broadcast to newspaper articles), it would not have been obvious to adopt this approach in Chesnais' category-driven system. The Board briefly commented on certain of Interval's obviousness arguments relating to the combination of Chesnais and Bender, but failed to address the fundamental incompatibility of segment-to-segment comparisons and the topic categorization approach of the Chesnais system.

The Fishwrap online newspaper system disclosed by Chesnais is based on the principle of organizing and presenting online news articles according to topic

categories. Each user provides a profile of topics of interest that is used to determine which articles will be presented to the user. A128. The topic categories from which a user can select are defined in a "knowledge base of topic definitions." A131. News articles received by Fishwrap are sorted into those topic categories based on keyword "signatures" that are determined through analysis of the words contained therein. A131-132; A1855 at ¶ 16. Fishwrap initially presents the user with a table of contents that lists news categories corresponding to the user's profile. A128-129. When the user selects a category, articles from within that subject matter category are displayed. A129. All of the navigation in the Fishwrap system follows this category-based structure. A128-129, A133.

Because the Chesnais system organizes information by predetermined categories and selects which articles to display based on category selections, there is no reason to determine whether individual articles are related to each other. A1856 at ¶¶ 18, 19. The user's selection of a particular category of interest serves the purpose of identifying which articles should be displayed in a topic-driven system like Chesnais, so article-to-article comparisons are not required.

The Examiner's assertion that combining Chesnais and Bender would be "computationally inexpensive" and would "work[] well," which the Board agreed with, glosses over significant technical differences between the two systems and depends on assumptions about how Chesnais works that are not supported by the

evidence. A20. First, as explained above, the photos and sound recordings of Chesnais do not have "signatures" containing "keywords" upon which the text-based matching scheme of Bender could be used. In the absence of suitable text-based information for keyword comparison, it can hardly be assumed that it would "work well" to use Bender's approach to compare photos and sound recordings to news articles in Chesnais. *See Lee*, 277 F.3d at 1343-44 (explaining that obviousness combinations must be based on "objective evidence of record" rather than "subjective belief and unknown authority").

Second, Bender and Chesnais are fundamentally different and it cannot simply be assumed that Bender's approach could be imported into Chesnais. Bender describes comparing a television news broadcast to various online news articles, which requires one comparison of each television broadcast to each news article. There is a natural limit on the number of television news programs that will be broadcast on a given day, which effectively provides a limit on the number of comparisons necessary for the Bender system to operate. Chesnais, in contrast, describes a revolving library containing thousands of articles. *See* A1324 n.2. Running comparisons between every possible pair of thousands of articles in the Chesnais library would require exponentially more computational effort than the

Bender system.[1] There is no evidence that the limited segment-to-segment comparisons of Bender would be "computationally inexpensive" or "work well" if imported into the Chesnais system. *See In re Ratti*, 270 F.2d 810, 813 (CCPA 1959) (reversing obviousness rejection where the proposed combination "would require a substantial reconstruction and redesign of the elements shown in [one prior-art reference] as well as a change in the basic principles under which [that reference's] construction was designed to operate").

The Board's conclusion that Bender would have made it obvious to modify Chesnais to perform the claimed comparison of "data representing a segment of the body of information to data representing a different segment of the body of information to determine, whether . . . the compared segments are related" is unsupported by evidence. It follows that the Board's affirmance of the Examiner's final rejection under 35 U.S.C § 103(a) of claims 20 through 24, 27, 31, 34, 37, 38, 63 through 67, 70, 74, 77, 80, and 81, each of which contains this limitation (either itself or via dependency), must be reversed. *See* A19-21; *see Lee*, 277 F.3d at 1343-44 (vacating obviousness rejection that was unsupported by evidence).

[1] For example, comparing 10 news broadcasts to 1,000 articles would require 10,000 comparisons, while comparing every combination of 1,000 articles would 499,500 comparisons.

IV. The Board's Footnote About Bender Is Improper And Warrants Review

Having found no error in the rejections based on Joachims and the rejection based on Chesnais and Bender, the Board did not formally reach any rejections based on Bender as a primary reference. Nevertheless, it included a footnote at the end of its decision expressing the view that Bender "generat[es] a display of a portion of, or a representation of, a second segment of the body of information" as the claims require. A21 n.3; *see* '507 patent at 38:52-53 (independent claim 20) (A55), 44:10-12 (independent claim 63) (A58).

The Board did so without addressing Interval's argument that Bender did not satisfy this limitation because it was only capable of displaying the full text of the news articles accompanying the television broadcast (*i.e.*, the full second segment rather than "a portion or representation of the second segment"). A21 n.3. The Board also announced its own mapping of the Bender disclosure to the claim elements, which departed from the mappings previously articulated by the Examiner and set forth in the grounds of rejection. *Id.*

In view of the Board's decision to informally address the rejections based on Bender and in the interest of avoiding a possible second appeal on these issues, Interval requests that the Court provide guidance on the correct construction of "portion or representation of the second segment" and hold that the Board's mapping of the claim language to the Bender constitutes a new ground of rejection that requires reopening of prosecution.

A. Bender Does Not Disclose Displaying "A Portion Of, Or A Representation of, A Second Segment" Under The Correct Construction

Bender describes a three-part display including a live television broadcast, still images recorded from the live television broadcast, and the full text of related news articles:

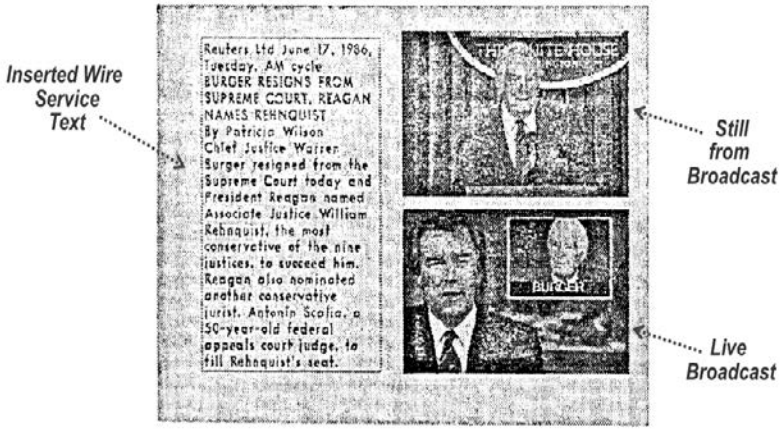


Figure 2: Network Plus. The live broadcast is in the lower right quadrant. Salient stills are in the upper right. Text from the wire services is on the left.

A118 (annotations added). The rejections relying on Bender as the primary reference mapped the claimed display of the "first segment" to both the live broadcast shown in the lower right portion of the screen in Fig. 2 of Bender and the video still "extracted from the broadcast" shown in the upper right portion of the screen. *See* A1667, A1679-1679, A1688, A1697. The adopted rejections then mapped the claimed display of "a portion of, or a representation of, a second segment" to Bender's display of the news wire story on the left side of the screen. *See* A1669-1670, A1681, A1691, A1700-1701.

Interval argued that Bender does not meet the claim limitation of "generating a display of a portion of, or a representation of, a second segment" because the entire wire service news article is displayed rather than a portion or representation thereof. This feature of Bender follows from the fact it was aimed at a type of television news broadcast and did not contemplate any way for the user to interact with or control the display. *See supra* at 12-13.

In rebuttal, the Examiner did not disagree with Interval's argument that Bender displays the entire wire service news article, and did not substantively respond to Interval's arguments explaining the broadest reasonable interpretation in view of the claim language and specification. A1223, A1460-A1466. Instead, the Examiner offered a number of alternative mappings of the claims onto Bender's system that were inconsistent with the adopted grounds of rejection and that were nevertheless incorrect for a variety of reasons. *See, e.g.*, A1223, A1298-1300, A1460-A1466, A1528-1535.

In its footnote discussing Bender, the Board suggested that the Examiner need not give patentable weight to this limitation, and that any two display fields in Bender would meet the claims. A21 n.3. The Board did not address Interval's argument that "a portion of, or a representation of, the second segment" could not reasonably be construed to cover the display of the full second segment. *Id.* This

interpretation is evident from the language of the claims and from the supporting embodiments in the '507 patent.

To begin with, independent claims 20 and 63 differentiate between displaying all of a segment and only a part of a segment with the different wording used for the first and second segments. *See Phillips*, 415 F.3d at 1314 ("[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms.") These claims recite "generating a display of a first segment of the body of information." '507 patent at 38:44-45 (claim 20) (A55); *id.* at 44:2-3 (claim 63) (A58). In contrast, in the case of the second segment, the claims recite "generating a display of *a portion of, or a representation of*, a second segment of the body of information." *Id.* at 38:52-53 (claim 20) (A55); *id.* at 44:10-12 (claim 63) (A58). These independent claims expressly distinguish between displaying the full first segment and a more limited display of a portion or representation of the second segment.

Interval's interpretation is reinforced by the language of dependent claims 23 and 66, which recite "identifying the selection of a second segment *for which a portion or representation* is being displayed, wherein selection of such second segment causes an audiovisual display of *the selected second segment* to be produced." *Id.* at 39:4-8 (claim 23), 44:32-37 (claim 66) (A56, A58). In contrast to claims 20 and 63, these claims require the display of the full second segment.

The claims draw a direct contrast between the display of "a portion of, or a representation of, a second segment" (displayed automatically in response to the display of the first segment) and the display of the full second segment (displayed after a selection is made). These dependent claims would make no sense if "a portion of, or a representation of, the second segment" encompassed the entire second segment, since the full second segment would already be displayed when the selection was made.

The specification further supports this interpretation. In particular, it describes that as a first segment of primary information (*e.g.*, a news story) is displayed on a primary display device 102, the user interface generates and displays portions or representations of related second segments (*e.g.*, thumbnails 203 or secondary information displays 204). *Id.* at 12:29-49, 16:5-17:11 (A42, A44-45). The described displays of the portions or representations of the second segments are only portions (*e.g.*, a single frame of a video image or a text excerpt) or representations (*e.g.*, a text summary or a pictorial representation) of the second segments; they are never described as a display of the entire second segment. *Id.* at 16:55-17:4 (A44-45). The disclosure never contemplates a user interface where a full display of a second segment is generated in response to the display of the first segment. It is therefore unreasonable to construe "a portion of, or a representation of, a second segment" to encompass a display of the entire second segment. *ICON*,

496 F.3d at 1379 (explaining that the broadest reasonable construction must be "consistent with the specification").

Because the Board's sweeping conclusion that "any two display fields in Bender would meet the claim" (A21) is not consistent with a reasonable construction of "a display of a portion of, or a representation of, a second segment" and because this term will be significant on remand, Interval respectfully requests that this Court clarify that the interpretation articulated by the Board in its footnote is not a reasonable construction.

B. The Board's New Mapping Of The Claims To Bender Constitutes A New Ground Of Rejection

The Board's footnote about Bender also expresses the view that the correspondence between Bender and the claims "that seem[s] to most closely track what Owner intends their claims to cover" involves mapping Bender's display of the news wire article to the first segment and mapping Bender's display of the video still to the portion or representation of the second segment. A21 n.3.

In addition to being premised on an unreasonably broad claim construction as shown above, these arguments directly conflict with the Examiner's grounds of rejection based on Bender and constitute new grounds of rejection to which Interval had no opportunity to respond. The Board's preferred mapping of the claims onto Bender is the opposite of that asserted in the adopted grounds of rejection:

	Identified "First Segment"	**Identified "Portion or Representation of the Second Segment"**
Examiner's Rejection	Live video broadcast plus still image from broadcast	News wire article
Board's Footnote	News wire article	Still image from broadcast

Compare A995-A998 (incorporating by reference A1660-A1701)) *with* A21.

"Mere reliance on the same statutory basis and the same prior art references, alone, is insufficient to avoid making a new ground of rejection when the Board relies on new facts and rationales not previously raised to the applicant by the examiner." *In re Leithem,* 661 F.3d 1316, 1319 (Fed. Cir. 2011). The ultimate criterion is whether the appellant has had before the PTO a "fair opportunity to react to the thrust of the rejection." *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011). If that condition is not met, the Board must designate its decision a new ground of rejection and provide the appellant with an opportunity to respond. *See Stepan,* 660 F.3d at 1346. Failure to do so violates the appellant's notice rights and warrants vacatur of the Board's decision. *Id.* The Board has a procedure for issuing a new ground of rejection in appeals of *ex parte* reexaminations. 37 C.F.R. § 41.50(b). This procedure ensures that appellants have an appropriate opportunity to respond and, if necessary, supplement the record.

Interval has not had an opportunity to respond to this mapping of the elements by, for example, showing that the still image is not displayed "in response to" (*i.e.*, in reaction to) the display of the text article. *See* A115-A116. Interval respectfully requests that the Court hold that the Board's stated interpretation of Bender in relation to the claims constitutes a new ground of rejection that would require reopening of prosecution to afford Interval a fair opportunity to respond.

V. The Board's Affirmance Of Rejections It Did Not Review Must Be Vacated

Although the Board only reviewed a subset of the Examiner's rejections, it nevertheless affirmed the Examiner's rejections of all claims, including the following claims that were not subject to any of the rejections that the Board actually reviewed: 130, 132, 134-136, 139-141, 152, 157-162, 164, 166-171, 180, and 185-187. *Compare* A22 (affirming rejection of claims "130 through 188") *with* A10-21 (reviewing rejections that covered some, but not all, of claims 130 through 188). Because the Board did not review any rejections applicable to those claims, its affirmance of those rejections was improper. *See Gechter v. Davidson*, 116 F.3d 1454, 1460 (Fed. Cir. 1997) ("[T]he Board is required to set forth in its opinions specific findings of fact and conclusions of law adequate to form a basis for our review."); *see also In re Karpf*, No. 2014-1035, 2014 U.S. App. Lexis 14152, at *13 (Fed. Cir. July 25, 2014) ("Because the record is not clear regarding

the grounds on which the Board relied to reject claim 23, we vacate the rejection of claims 23-25 and remand . . . .").

CONCLUSION

For the foregoing reasons, the Court should reverse the Board's rejections of claims 20-24, 27, 28, 31, 34, 37, 38, 63-67, 70, 71, 74, 77, 80, 81, and 130-188 and remand for further proceedings.

Respectfully submitted,

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November 10, 2014

ADDENDUM

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte INTERVAL LICENSING

Appeal 2014-002901
Reexamination Controls 90/011,577 & 90/012,074
Patent 6,263,507 B1
Technology Center 3900

Before ROBERT E. NAPPI, THU A. DANG, and JASON V. MORGAN, *Administrative Patent Judges*.

NAPPI, *Administrative Patent Judge*.

DECISION ON APPEAL

Patent Owner ("Owner") appeals under 35 U.S.C. § 134(b) and 306 from the Final Rejection of claims 20 through 24, 27, 28, 31, 34, 37, 38, 63 through 67, 70, 71, 74, 77, 80, 81, and 130 through 188. Claims 39, 40, 43, 82, 83, and 86 are canceled and are not appealed. Claims 1 through 19, 25, 26, 29, 30, 32, 33, 35, 36, 41, 42, 44 through 62, 68, 69, 72, 73, 75, 76, 78, 79, 84, 85, and 87 through 129 are not subject to reexamination. We have jurisdiction under 35 U.S.C. §§ 134(b) and 306. We heard oral arguments at the Oral Hearing held on May 14, 2014.

We affirm.

STATEMENT OF THE CASE

This proceeding arose from a request for ex parte reexamination filed March 17, 2011 (Control No. 90/011,577), and a request for ex parte reexamination filed December 28, 2011 (Control No. 90/012,074). Both filings requested reexamination of U.S. Patent 6,263,507 B1 (hereinafter the '507 patent) issued to Subutai Ahmad, Neal A. Bhadkamkar, Steve B. Cousins, Emanuel E. Farber, Paul A. Freiberger, Christopher D. Horner, Philippe P. Piernot, and Brygg A. Ullmer on July 17, 2001. The USPTO granted and subsequently merged the two requests (*See* Decision Merging Proceedings, August 1, 2012).

The '0507 patent relates to a system that facilitates the review of a body of information (*see* Abstract of the '507 patent). Claim 20 is representative and reproduced below:

20. A method for acquiring and reviewing a body of information, wherein the body of information includes a plurality of segments, each segment representing a defined set of information in the body of information, the method comprising the steps of:

acquiring data representing the body of information;

storing the acquired data;

generating a display of a first segment of the body of information from data that is part of the stored data;

comparing data representing a segment of the body of information to data representing a different segment of the body of information to determine whether, according to one or more predetermined criteria, the compared segments are related; and

generating a display of a portion of, or a representation of, a second segment of the body of information from data that is part of the stored data, wherein the display of the portion or representation of the second segment is generated in response to the display of a first segment to which the second segment is related.

REFERENCES

Orr	US 5,537,151	Jul. 16, 1996
Russo	US 5,701,383	Dec. 23, 1997
Reilly	US 5,740,549	Apr. 14, 1998

WIRE SERVICE TRANSMISSION GUIDELINES SPECIAL REPORT NUMBER 84-2, American Newspaper Publishers Association (June 15, 1984)

Walter Bender & Pascal Chesnais *Network Plus* 900 SPIE Imaging Applications in the Work World (1988)

Brij Masand et al. *Classifying News Stories using Memory Based Reasoning* The 15th Annual Int'l SIGIR, Assn for Computing Machinery 59-65 (June 1992)

THE ASSOCIATED PRESS STYLEBOOK AND LIBEL MANUAL (Norm Goldstein ed., 1994)

Thorsten Joachims et al. *WebWatcher: Machine Learning and Hypertext* Carnegie Mellon University (May 29, 1995)

Pascal R. Chesnais et al. *The Fishwrap Personalized News System* IEEE 275-282 (1995)

Rune Hjelsvold et al. *Integrated Video Archive Tools* Assn for Computing Machinery 283-293 (1995)

Makoto Iwayama & Takenobu Tokunaga *Cluster-Based Text Categorization: A Comparison of Category Search Strategies* SIGIR '95 Assn for Computing Machinery 273-280 (1995)

REJECTIONS AT ISSUE

Rejections based upon Reilly

The Examiner has rejected original claims 20 through 24, 31, 34, 37, 63 through 67, 74, 77 and 80 under 35 U.S.C. § 102(e) anticipated by Reilly. Final Rejection 3.[1]

The Examiner has rejected original claims 27, 38, 70, and 81 under 35 U.S.C. § 103(a) as unpatentable over Reilly and Bender. Final Rejection 3.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Reilly and Admitted Prior Art. Final Rejection 3.

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[1] Throughout this opinion we refer to the Final Rejection dated May 6, 2013, Examiner's Answer mailed on October 18, 2013, and Owner's Brief filed September 9, 2013, and Reply Brief filed December 18, 2013.

The Examiner has rejected new claims 130, 132 through 136, 138 through 141, 143 through 147, 150 through 154, 156 through 162, 164 through 175, 178 through 181, and 185 through 188 under 35 U.S.C. § 102(e) anticipated by Reilly. Final Rejection 5.

The Examiner has rejected new claims 148, 149, 176, and 177 under 35 U.S.C. § 103(a) as unpatentable over Reilly and Iwayama. Final Rejection 5.

The Examiner has rejected new claims 131, 137, 142, 155, 163, 165, and 182 through 184 under 35 U.S.C. § 103(a) as unpatentable over Reilly and Bender. Final Rejection 5.

Rejections based upon Bender and Russo

The Examiner has rejected original claims 20, 21, 24, 27, 31, 34, 37, 38, 63, 64, 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Bender and Russo. Final Rejection 3.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Bender, Russo, and Admitted Prior Art. Final Rejection 3.

The Examiner has rejected original claims 22, 23, 65, and 66 under 35 U.S.C. § 103(a) as unpatentable over Bender, Russo, and Chesnais. Final Rejection 3.

Rejections based upon Bender and Orr

The Examiner has rejected original claims 20, 21, 24, 27, 31, 34, 37, 38, 63, 64, 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Bender and Orr. Final Rejection 3.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Bender, Orr, and Admitted Prior Art. Final Rejection 3.

The Examiner has rejected original claims 22, 23, 65, and 66 under 35 U.S.C. § 103(a) as unpatentable over Bender, Orr, and Chesnais. Final Rejection 3.

Rejections based upon Bender and Reilly

The Examiner has rejected original claims 20 through 24, 27, 31, 34, 37, 38, 63 through 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Bender and Reilly. Final Rejection 4.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, and Admitted Prior Art. Final Rejection 4.

The Examiner has rejected new claims 130 through 147, 150 through 157, and 178 through 188 under 35 U.S.C. § 103(a) as unpatentable over Bender and Reilly. Final Rejection 6.

The Examiner has rejected new claims 148, 149, 176, and 177 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, and Iwayama. Final Rejection 6.

The Examiner has rejected new claims 134, 135, 160, 166, 168, 180, and 188 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, and Chesnais. Final Rejection 6.

The Examiner has rejected new claims 158, 159, 186, and 187 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, and Russo. Final Rejection 6.

The Examiner has rejected new claims 134, 135, 160, 166, 168, 180, and 188 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, Russo, and Chesnais. Final Rejection 6.

The Examiner has rejected new claims 158, 159, 186, and 187 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, and Orr. Final Rejection 6.

The Examiner has rejected new claims 134, 135, 160, 166, 168, 180, and 188 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, Orr, and Chesnais. Final Rejection 6.

The Examiner has rejected new claims 158, 159, 186, and 187 under 35 U.S.C. § 103(a) as unpatentable over Bender, Reilly, and Hjelsvold. Final Rejection 6.

Rejections based upon Bender and Hjelsvold

The Examiner has rejected original claims 20, 21, 24, 27, 31, 34, 37, 38, 63, 64, 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Bender and Hjelsvold. Final Rejection 4.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Bender, Hjelsvold, and Admitted Prior Art. Final Rejection 4.

The Examiner has rejected original claims 22, 23, 65, and 66 under 35 U.S.C. § 103(a) as unpatentable over Bender, Hjelsvold, and Chesnais. Final Rejection 4.

Rejections based upon Chesnais, AP Stylebook, and Wire Service Transmission Guidelines

The Examiner has rejected original claims 20 through 24, 27, 31, 34, 37, 38, 63 through 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Chesnais, AP Stylebook, and Wire Service Transmission Guidelines. Final Rejection 4.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Chesnais, AP Stylebook, Wire Service Transmission Guidelines, and Admitted Prior Art. Final Rejection 4.

The Examiner has rejected new claims 130 through 147, 150 through 175 and 178 through 188 under 35 U.S.C. § 103(a) as unpatentable over Chesnais, AP Stylebook , Wire Service Transmission Guidelines, and Joachims. Final Rejection 5.

The Examiner has rejected new claims 148, 149, 176, and 177 under 35 U.S.C. § 103(a) as unpatentable over Chesnais, AP Stylebook, Wire Service Transmission Guidelines, Joachims, and Iwayama. Final Rejection 5.

The Examiner has rejected new claims 148, 149, 176, and 177 under 35 U.S.C. § 103(a) as unpatentable over Chesnais, AP Stylebook, Wire Service Transmission Guidelines, Joachims, and Masand.

Rejections based upon Chesnais and Bender

The Examiner has rejected original claims 20 through 24, 27, 31, 34, 37, 38, 63 through 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Chesnais and Bender. Final Rejection 4.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Chesnais, Bender, and Admitted Prior Art. Final Rejection 4.

Rejections based upon Joachims

The Examiner has rejected original claims 20 through 24, 31, 34, 37, 63 through 67, 74, 77, and 80 under 35 U.S.C. § 102(b) anticipated by Joachims. Final Rejection 4.

The Examiner has rejected original claims 27 and 70 under 35 U.S.C. § 103(a) as unpatentable over Joachims, and Bender. Final Rejection 5.

The Examiner has rejected original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Joachims, Bender, and Admitted Prior Art. Final Rejection 5.

The Examiner has rejected new claims 130, 132, 134 through 136, 139 through 141, 152, 157 through 162, 164, 166 through 171, 180, and 185 through 188 under 35 U.S.C. § 102(a) anticipated by Joachims. Final Rejection 7.

The Examiner has rejected new claims 131, 133, 137, 138, 142, 143, 154 through 156, 163, 165, and 182 through 184 under 35 U.S.C. § 103(a) as unpatentable over Joachims and Bender. Final Rejection 7.

The Examiner has rejected new claims 143 through 147, 150, 151, 153 through 156, 165, 172 through 175, 178, 179, 181, 184, and 188 under 35 U.S.C. § 103(a) as unpatentable over Joachims, and Reilly. Final Rejection 7.

The Examiner has rejected new claims 148, 149, 176, and 177 under 35 U.S.C. § 103(a) as unpatentable over Joachims, Reilly, and Iwayama. Final Rejection 7.

ANALYSIS

We begin our review of the Examiner's rejections of the reexamination claims addressing the rejections based upon Joachims.

Rejection of claims 20 through 24, 31, 34, 37, 63 through 67, 74, 77, and 80 under 35 U.S.C. § 102(b) anticipated by Joachims

Owner argues that Joachims teaches a system, titled WebWatcher, which inserts a menu bar at the top of an original page and when the user selects the "Mark this page as interesting" button, the system finds and displays a list of related web pages. Appeal Brief 77-79. Owner argues this feature does not meet the claimed requirement of generating a display of the portion or representation of a second segment in response to the display of a first segment which is related to the second segment. Appeal Brief 80-82. Owner asserts that "because WebWatcher never displays the list of related links [which are equated to the second portion] unless and until the user selects the 'Mark this page as interesting' option, the display of the list of related links is not generated in response to the display of the ILPNET page." Appeal Brief 80. Owner asserts that broadest reasonable interpretation of independent claims 20 and 63 is that the second segment "occurs in reaction to the display of the related first segment, and not, instead, in reaction to an intervening action on the part of a user." Appeal Brief 81. Owner reasons that the claims require a causal relationship

between two displays and that, as such, require the automatic identification without any user intervention. Appeal Brief 81-82, 22-27.

However, the Examiner finds that the "ILPNET" page displayed in Joachims Figure 5 is the claimed first segment, and the list of web pages WebWatcher estimates as closely related is the portion or representation of the second segment. Final Rejection 74. In response to Owner's arguments, the Examiner finds WebWatcher has a learning machine aspect and each time a user selects a hyperlink or suggest a page is interesting WebWatcher logs the selection to learn for future advice. Answer 60. Further, the Examiner finds WebWatcher will insert advice anytime the user takes a hyperlink without clicking on the "Mark this page as interesting" button. Answer 61. The Examiner further finds that independent claims 20 and 63 do not recite "automatic generation" as argued by Owner and that while such limitation is recited in the Specification, and newly filed claim 174, it is not recited in claim 20.

We disagree with Owner's proffered claim interpretation. Contrary to Owner's arguments, we do not consider the Specification to require the display of a second portion in response to the display of a first segment to require the generation of the display to be automatic and without user intervention. As stated by the Examiner, the claim does not recite the display is generated in response to the display of the first segment, rather the portion or representation of the second segment is generated in response to the display of the first segment. Further, while the Specification does disclose an embodiment where the display is automatic without user intervention, we decline to read such limitations into claim 20. We additionally note that the Specification also discusses an embodiment where

the display of the second segment is predicated upon user action in addition to second section being generated in response to the display of the first segment. *See* Col. 14, ll. 60-63 ("[A] GUI according to the invention could be implemented such that a display of the related secondary information [reaction] is produced only upon appropriate interaction with one or more menus and/or dialog boxes."). Thus, we disagree with the claim interpretation proffered by Owner as we do not find the evidence supports Owner's claim interpretation. Similarly, we disagree with the claim interpretation proffered in the October 11, 2011, Declaration of Danny Goodman (Exhibit A of Appeal Brief). The Declaration in paragraph 22, cites to col. 3, ll. 43-45 of the Specification of the '507 patent, which describes the automatic embodiment, and col. 19, ll. 2-4, which states that when the primary information display changes the secondary information displays "typically" change as well, neither portion limits the term "in response to" to automatic (without user intervention). Finally, we are not persuaded of error by Owner's argument based upon *American Calcar, Inc. v. American Honda Motor Co., Inc.*, 651 F.3d 1318, 1340 (Fed. Cir. 2011), to show that "in response to" requires an automatic action without user interaction. Appeal Brief 25. The Federal Circuit's decision in *American Calcar, Inc. v. American Honda Motor Co., Inc.* involves a district court's claim construction which is not based upon the broadest reasonable interpretation standard, and is based upon the disclosure in particular to that case. As such, the holding does not have direct bearing on the case currently before us. Thus, we concur with the Examiner's interpretation of the limitation "generating . . . in response to the display of [the] first segment" to be such that there is a causal relationship between the first and second

segments, but not limited to the generation being automatic and without user interaction.

Having determined the scope of the claim, we look to the Examiner's finding that Joachims anticipates the claim 20 limitation of "generating a display of a portion of, or a representation of, a second segment . . . in response to the display of a first segment to which the second segment is related." We concur with the Examiner's finding that the "ILPNET" page displayed in Joachims Figure 5 meets the claimed first segment, and the list of web pages WebWatcher estimates as closely related is the portion or representation of the second segment. Joachims teaches that this second portion is identified and displayed in response to the display of the first page in that it is identified and displayed because it is related to the first segment (*see* the last paragraph of section 2 of Joachims). This finding is also consistent with statements made in paragraphs 23-34 of the Declaration of Danny Goodman. We, however, disagree with Owner's arguments and the statements in the Declaration that Joachims differs from the claimed invention as the display of the second segment requires user action. As discussed above, we do not find representative claim 20 to be so limited. Accordingly, Owner's arguments have not persuaded us of error in the Examiner's rejection of representative claim 20 and we sustain the anticipation rejection of claim 20 based upon Joachims. As Owner has not separately argued claims 21 through 24, 31, 34, 37, 63 through 67, 74, 77, and 80, we similarly sustain the anticipation rejection of these claims based upon Joachims.

Rejection of original claims 27 and 70 under 35 U.S.C. § 103(a) as

unpatentable over Joachims and Bender.

Owner argues that modifying Joachims to include keyword matching, such as taught in Bender, would not lead to a predictable result. Appeal Brief 82-83. Owner reasons the combination is not predictable because of the "vast differences between the two systems." Appeal Brief 82. Further, Owner argues the Examiner's conclusion directed to the obviousness of the combination is based upon an improper use of Official Notice. Appeal Brief 82-83.

The Examiner finds that Bender teaches comparing keywords of two segments of data. Final Rejection 89. The Examiner finds that "Both Joachims and Bender relate to systems and methods for collecting and reviewing information, comparing data representing that information to identify related information, and presenting the related information to a user in a computer based interface." Final Rejection 90 and Answer 63. Based upon these findings the Examiner concludes the skilled artisan would combine the teachings as the result would provide the predictable and expected result of deterring subject matter similarities between web pages. Final Rejection 90.

We concur with the Examiner's findings as they are supported by the Bender's disclosure (see Bender, section titled "2. SCOPE OF THIS EXPERIMENT") and Joachims disclosure (see first two paragraphs of Joachims section titled "2 WebWatcher"). We agree with the Examiner's conclusion and consider it supported by sufficient rationale. We note this combination of the references is substitution of the use of one form of determining similarities between documents with another (i.e., using known functions to produce their known results). Owner has not explained nor do

we find there to be such "vast differences" between the two systems which would preclude the skilled artisan from combining the references. Thus, we are not persuaded that the Examiner erred in modifying Joachims to include keyword matching, such as taught in Bender.

Owner's arguments directed to the Examiner's use of Official Notice is not persuasive of error as the Examiner's rejection did not rely upon Official Notice, and as discussed above, the Examiner has provided sufficient rationale. We note that Owner, in the Reply Brief, also presents arguments directed to Joachims teaching way. However, these arguments are deemed waived as they were presented for the first time in the Reply Brief. Owner has not explained why, nor is it apparent that, these arguments were necessitated by a new point in the Answer or any other circumstance constituting "good cause" for its belated presentation. *See Ex parte Borden*, 93 USPQ2d 1473, 1473-74 (BPAI 2010) ("informative") (absent a showing of good cause, the Board is not required to address arguments in the Reply Brief that could have been presented in the principal Brief). Further, had they been timely presented, we do not find the argument persuasive. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). We do not consider the passages of Joachims cited by Owner to support the argument of teaching away, i.e. the passages do not discourage the use of comparing keywords of two segments of data, rather they merely show that Joachims determines similarity of data based upon another method.

For the aforementioned reasons, Owner's arguments have not persuaded us of error in the Examiner's obviousness rejection of claims 27 and 70 based upon Joachims and Bender and we sustain the rejection.

Rejection of original claims 28 and 71 under 35 U.S.C. § 103(a) as unpatentable over Joachims, Bender and Owner's Admission

Owner argues the Examiner's finding that modifying Joachims with Bender and Owner's admission would yield predicable result is in error as it is not supported by evidence, and as such, is relying upon Official Notice, and is a conclusory statement upon which obviousness cannot be found. Appeal Brief 84-85.

These arguments have not persuaded us of error in the Examiner's findings of obviousness. As discussed above with respect to the rejection of claims 27 and 70, we do not find error in the Examiner's findings or conclusion that the skilled artisan would combine Joachims with Bender. The Examiner further finds that the Specification of the '507 patent includes an admission "that the use of relevance feedback methods to compare text was well known." Final Rejection 92-94. Further, the Examiner finds that the skilled artisan would use relevance feedback in combination with Joachims and Bender as it represents one of multiple methods that could be used to compare information. Final Rejection 93. We concur with the Examiner's finding and find it is supported by ample evidence. The Specification of the '507 patent states "[t]he use of relevance feedback to determine the similarity between two text segments is well-known." Col. 28, ll. 55-57. As with the combination of Joachims and Bender discussed above, the use of relevance feedback is substitution of the use of one form of

determining similarities between documents with another (i.e., using known functions to produce their known, predictable, results). Thus, we are not persuaded that the Examiner erred in modifying Joachims and Bender to include relevance ranking. For the aforementioned reasons, Owner's arguments have not persuaded us of error in the Examiner's obviousness rejection of claims 28 and 70 based upon Joachims and Bender and we sustain the rejection.

Rejection of new claims 131, 133, 137, 138, 142, 143, 154 through 156, 163, 165, and 182 through 184 under 35 U.S.C. § 103(a) as unpatentable over Joachims and Bender

Owner states that new claims 130 through 188 depend upon claims 20 or 63 and are directed to providing a user interface that allows navigation among related segments without having to return to a main menu or topic selection page and provide a brief summary of the claims. Appeal Brief 86. Owner argues that the arguments presented with respect to claim 20 apply to the rejection of these claims. Appeal Brief 89. Further, Owner argues Joachims limits the user's ability to navigate, as the user can only move from the original page to a web page that is pointed to by a common web page unless the user leaves the WebWatcher system. Appeal Brief 89.

As discussed above, Owner's arguments with respect to claim 20 have not persuaded us of error in the Examiner's anticipation rejection. Further, as the Examiner identified, Owner has not made it clear which claim limitations are not taught. Answer 66. Owner's arguments directed to these claims do not provide any specificity as to how the limitations are to be interpreted and differentiated from the art, other than what is argued for

claim 20. 37 C.F.R. § 41.37(c)(1)(iv) states "[a] statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim."[2] Further, the Examiner has provided a claim by claim analysis of where the claimed features are taught in Joachims. Final Rejection 190-200. Owner has not addressed in these findings. Thus, we are not persuaded of error in the Examiner's 103 rejection of claims 131, 133, 137, 138, 142, 143, 154 through 156, 163, 165, and 182 through 184.

Rejection of new claims 143 through 147, 150, 151, 153 through 156, 165, 172 through 175, 178, 179, 181, 184, and 188 under 35 U.S.C. § 103(a) as unpatentable over Joachims and Reilly and claims 148, 149, 176, and 177 under 35 U.S.C. § 103(a) as unpatentable over Joachims, Reilly, and Iwayama.

Owner argues that these claims are patentable over the combination of Joachims and Bender for the reasons set forth with respect to claim 20 and discussed with respect to the arguments discussed above with respect to the other rejections of the new claims.

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[2] We note that on page 37 of the Reply Brief, Owner identifies a specific limitation of claim 130 and states that the Examiner "makes no effort to explain in the Examiner's Answer how this requirement is met" and asserts that there is no automatic display. While the issue of automatic display was raised and discussed with respect to claim 20, Owner's argument directed to limitations of claim 130 are waived as they were raised for the first time in the Reply Brief. Further, the arguments do not address the Examiner's findings directed to these features on page 190 of the Final Rejection.

As discussed above, we are not persuaded of error in either the rejection of claim 20 or the rejections of the other new claims. Accordingly, we sustain the Examiner's obviousness rejections of claims 143 through 151, 153 through 156, 165, 172 through 179, 181, 184, and 188.

Other rejections

As we have found no error in the Examiner's rejection of claims 20 through 24, 27, 28, 31, 34, 37, 63 through 67, 70, 71, 74, 77, 80, and 130 through 188 based upon Joachims, alone or in combination with other teachings, we need not reach the other rejections of the claims. Review of alternative prior art bases for rejection of claims, which have already been determined to be appropriately rejected over the prior art, is discretionary. *See, e.g., In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009) (not reaching rejections based on obviousness when claims already are rejected as anticipated). However, as the Examiner did not include claims 38 and 81 in a rejection based upon Joachims, we consider the Examiner's rejection of original claims 20 through 24, 27, 31, 34, 37, 38, 63 through 67, 70, 74, 77, 80, and 81 under 35 U.S.C. § 103(a) as unpatentable over Chesnais and Bender.

Owner argues that Chesnais in combination with Bender fails to teach the claimed comparison step. Appeal Brief 74. Owner also argues that the combination of the references would not yield predictable results because of the vast differences between the two systems and because Bender compares a single item to several articles, which is much fewer than the thousands of articles used in Chesnais' Fishwrap system. Appeal Brief 74. In particular,

owner argues the Examiner's conclusion that the combination would yield predicable result is in error as it is not supported by evidence, and as such, is relying upon Official Notice. Appeal Brief 15. Further, Owner argues nothing in Bender suggests modifying Chesnais to comparing articles to articles or photos as Chesnais is a topic centric online newspaper. Appeal Brief 75 and 76.

> The Examiner, in response to Owner's arguments states:
>
> [I]n the rejection of claims, it is indicated why the [B]ender's comparison method would be advantageous. From the rejection, because Chesnais discloses that each item in the system is assigned a "signature" that includes keywords and discloses identifying photos and audio that "match" a news article, and Bender discloses using a keyword matching scheme to "match" news stories to a broadcast, one of skill in the art would have been motivated to combine Bender's keyword matching scheme with the disclosure of Chesnais to identify matching photos and sound recordings. Bender discloses that the Network Plus system's use of a threshold of four matching keywords to identify related items was "computationally inexpensive" and "worked well." Bender, p. 82. Thus, it would have been obvious to use the keyword matching scheme of Bender to compare information in Chesnais because the "signatures" contain keywords and the keyword matching scheme of Bender was "computationally inexpensive" yet also "worked well." Moreover, the combination of Chesnais and Bender yields a predictable result, and one of ordinary skill in the art would clearly be capable of combining these systems to achieve the expected result of determining similarities between two information sources.

Answer 55. We concur with the Examiner's findings and conclusion. We note this combination of the references does not rely upon Official Notice and is merely the substitution of one form of determining similarities between documents with another (i.e., using known functions to produce

their known results). In addition to the rationale provided by the Examiner, we note that Bender in the section titled Motivation specifically discusses synthesis of media, newspapers, and television, and as such, the skilled artisan would consider using Bender's teaching of providing multiple documents (segments)[3] which are related to each other in a custom newspaper such as Fishwrap which is disclosed in Chesnais. Accordingly, we are not persuaded of error in the Examiner's rejection of claims 20 through 24, 27, 31, 34, 37, 38, 63 through 67, 70, 74, 77, 80 and 81 under 35 U.S.C. § 103(a) as unpatentable over Chesnais and Bender and we sustain the Examiner's rejection.

DECISION

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[3] We recognize that with respect to the rejections based upon Bender, Owner argues Bender does not teach the claimed second portion or representation of a segment. Appeal Brief 46-50. Owner, in these arguments goes through several permutations of showing why the different display fields in Bender's Figures 1 and 2 do not match up with the claimed displays. In as much as Owner's arguments apply to this rejection, we are not persuaded of error by these arguments. The limitations directed to the displayed segments are merely describing the information displayed and are not functionally related to the claimed method. The Examiner need not give patentable weight to descriptive material absent a new and unobvious functional relationship between the descriptive material and the substrate. *See In re Ngai*, 367 F.3d 1336, 1338 (Fed. Cir. 2004); *In re Lowry*, 32 F.3d 1579, 1583-84 (Fed. Cir. 1994); *Ex parte Curry*, 84 USPQ2d 1272 (BPAI 2005). Further, we note that the claims do not require the first and second segment to be different, thus any two display fields in Bender would meet the claim. We also note the displays of Bender that seem to most closely track what Owner intends their claim to cover is the text article (left side of figure 2) as the first
Footnote continued on next page.

The decision of the Examiner to reject claims 20 through 24, 27, 28, 31, 34, 37, 38, 63 through 67, 70, 71, 74, 77, 80, 81, and 130 through 188 is affirmed.

Requests for extensions of time in this ex parte reexamination proceeding are governed by 37 C.F.R. § 1.550(c). See 37 C.F.R. § 41.50(f).

AFFIRMED

gvw

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segment and the still of the video (upper left of figure 2) as the portion or representation of the second segment.

US006263507B1

(12) **United States Patent**
Ahmad et al.

(10) **Patent No.: US 6,263,507 B1**
(45) **Date of Patent: Jul. 17, 2001**

(54) **BROWSER FOR USE IN NAVIGATING A BODY OF INFORMATION, WITH PARTICULAR APPLICATION TO BROWSING INFORMATION REPRESENTED BY AUDIOVISUAL DATA**

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(22) Filed: **Dec. 5, 1996**

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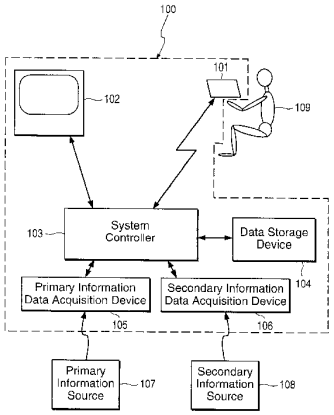
(74) *Attorney, Agent, or Firm*—David R. Graham

(57) **ABSTRACT**

The invention facilitates and enhances review of a body of information (that can be represented by a set of audio data, video data, text data or some combination of the three), enabling the body of information to be quickly reviewed to obtain an overview of the content of the body of information and allowing flexibility in the manner in which the body of information is reviewed. In a particular application of the invention, the content of audiovisual news programs is acquired from a first set of one or more information sources (e.g., television news programs) and text news stories are acquired from a second set of one or more information sources (e.g., on-line news services or news wire services). In such a particular application, the invention can enable the user to access the news stories of audiovisual news programs in a random manner so that the user can move quickly among news stories or news programs. The invention can also enable the user to quickly locate news stories pertaining to a particular subject. Additionally, when the user is observing a particular news story in a news program, the invention can identify and display related news stories. The invention can also enable the user to control the display of the news programs by, for example, speeding up the display, causing a summary of one or more news stories to be displayed, or pausing the display of the news stories. Additionally, the invention can indicate to the user which news story is currently being viewed, as well as which news stories have previously been viewed.

129 Claims, 6 Drawing Sheets



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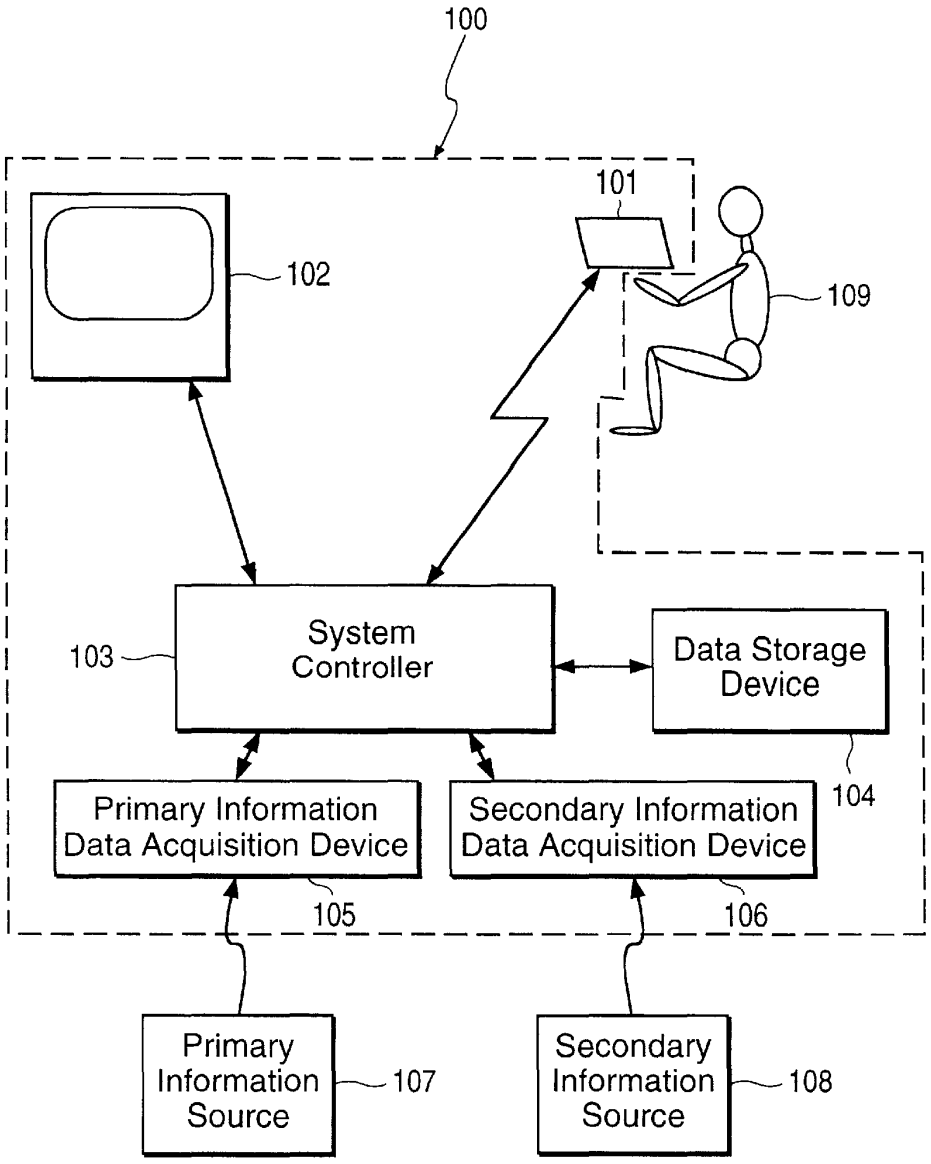

100
101
102
109
System Controller
103
Data Storage Device
104
Primary Information Data Acquisition Device
105
Secondary Information Data Acquisition Device
106
Primary Information Source
107
Secondary Information Source
108

FIG. 1

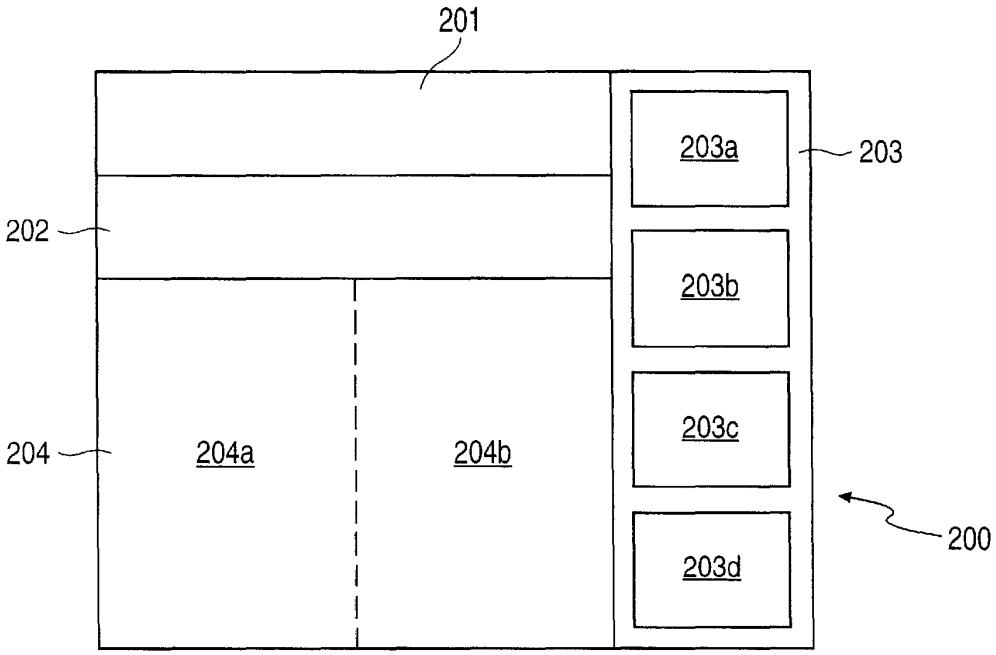
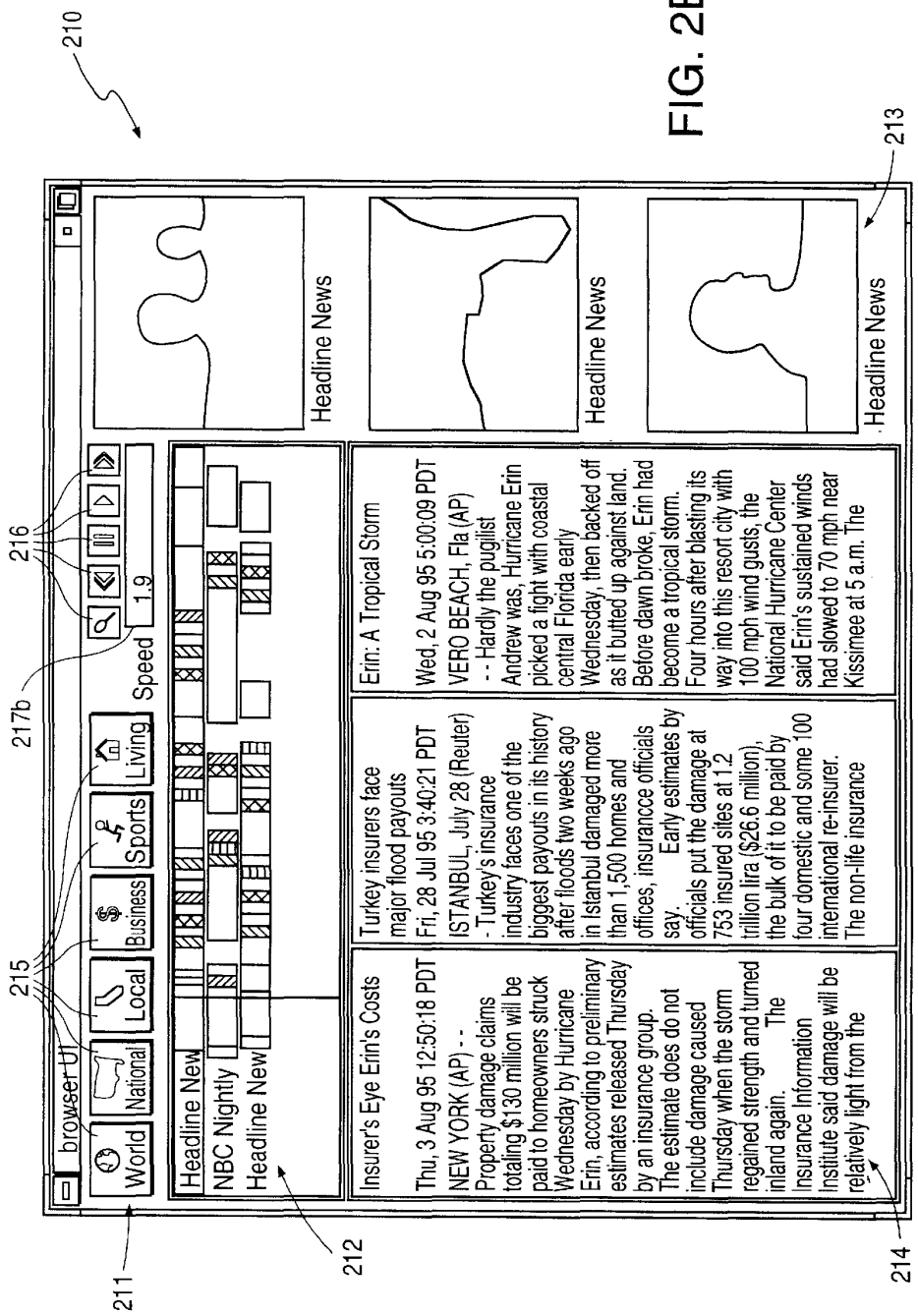


FIG. 2A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Business
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Headline New
NBC Nightly
Headline New
Headline News
Headline News
Headline News
Insurer's Eye Erin's Costs
Thu, 3 Aug 95 12:50:18 PDT
NEW YORK (AP) - -
Property damage claims totaling $130 million will be paid to homeowners struck Wednesday by Hurricane Erin, according to preliminary estimates released Thursday by an insurance group.
The estimate does not include damage caused Thursday when the storm regained strength and turned inland again. The Insurance Information Institute said damage will be relatively light from the
Turkey insurers face major flood payouts
Fri, 28 Jul 95 3:40:21 PDT
ISTANBUL, July 28 (Reuter) - Turkey's insurance industry faces one of the biggest payouts in its history after floods two weeks ago in Istanbul damaged more than 1,500 homes and offices, insurancce officials say. Early estimates by officials put the damage at 753 insured sites at 1.2 trillion lira ($26.6 million), the bulk of it to be paid by four domestic and some 100 international re-insurer. The non-life insurance
Erin: A Tropical Storm
Wed, 2 Aug 95 5:00:09 PDT
VERO BEACH, Fla (AP) - - Hardly the pugilist Andrew was, Hurricane Erin picked a fight with coastal central Florida early Wednesday, then backed off as it butted up against land. Before dawn broke, Erin had become a tropical storm. Four hours after blasting its way into this resort city with 100 mph wind gusts, the National Hurricane Center said Erin's sustained winds had slowed to 70 mph near Kissimee at 5 a.m. The

FIG. 2B

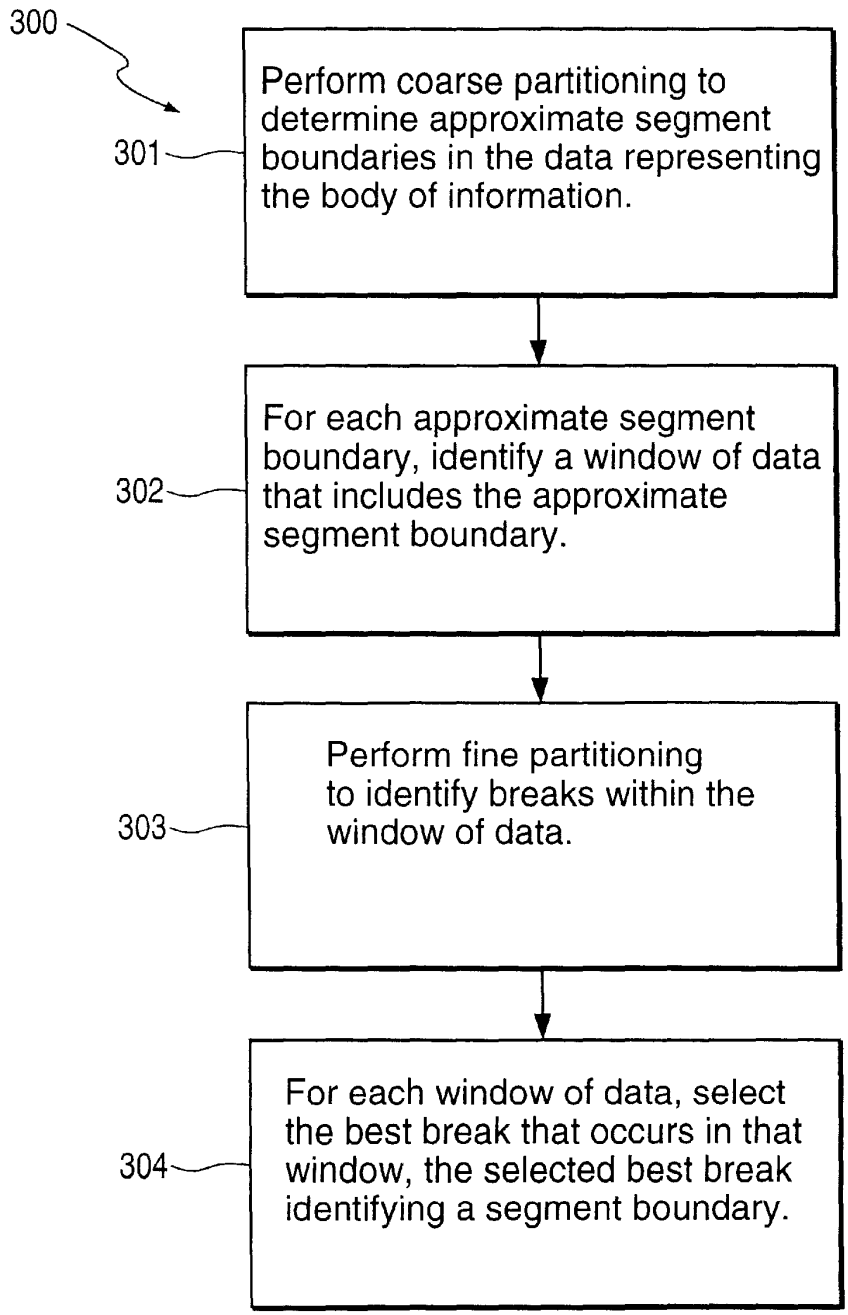
300
Perform coarse partitioning to determine approximate segment boundaries in the data representing the body of information.
301
For each approximate segment boundary, identify a window of data that includes the approximate segment boundary.
302
Perform fine partitioning to identify breaks within the window of data.
303
For each window of data, select the best break that occurs in that window, the selected best break identifying a segment boundary.
304

FIG. 3

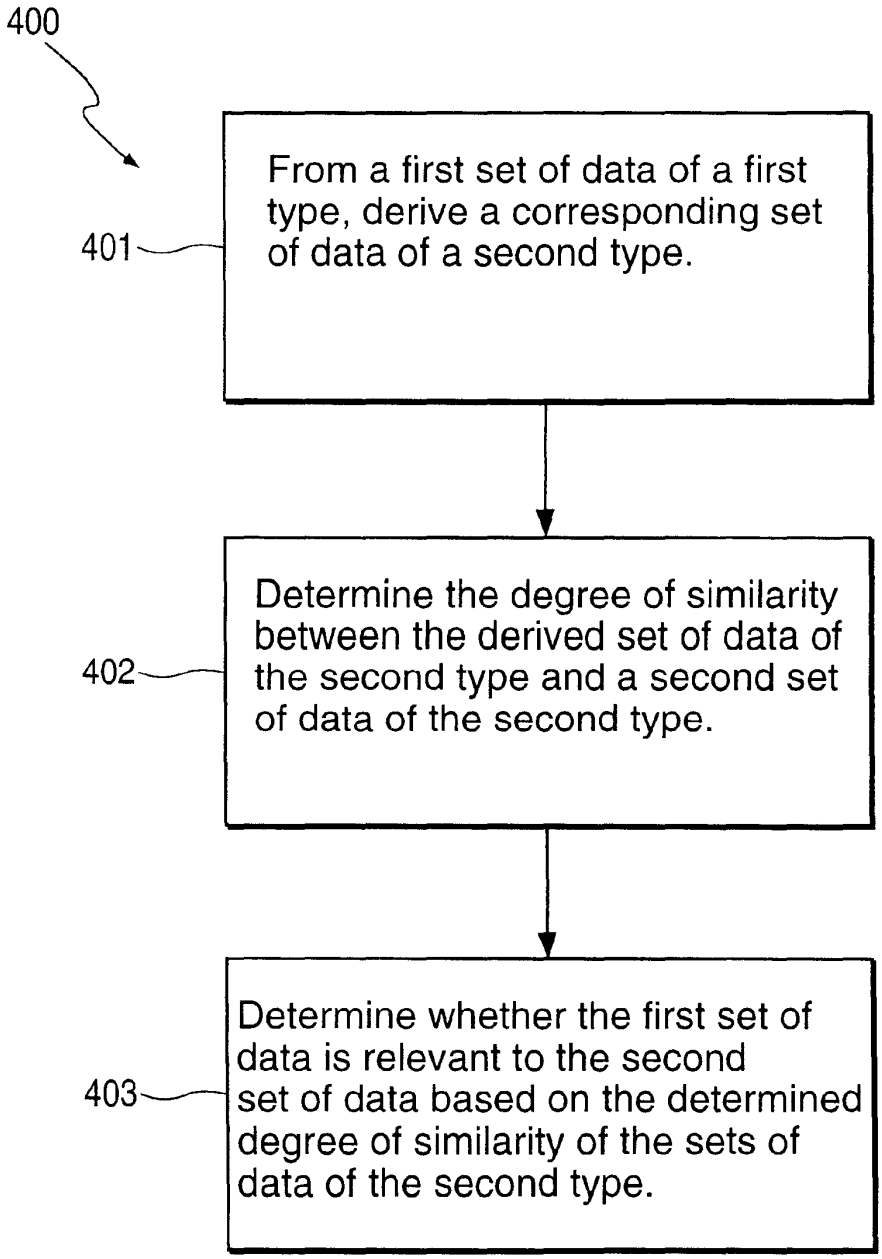
400
From a first set of data of a first type, derive a corresponding set of data of a second type.
401
Determine the degree of similarity between the derived set of data of the second type and a second set of data of the second type.
402
Determine whether the first set of data is relevant to the second set of data based on the determined degree of similarity of the sets of data of the second type.
403

FIG. 4

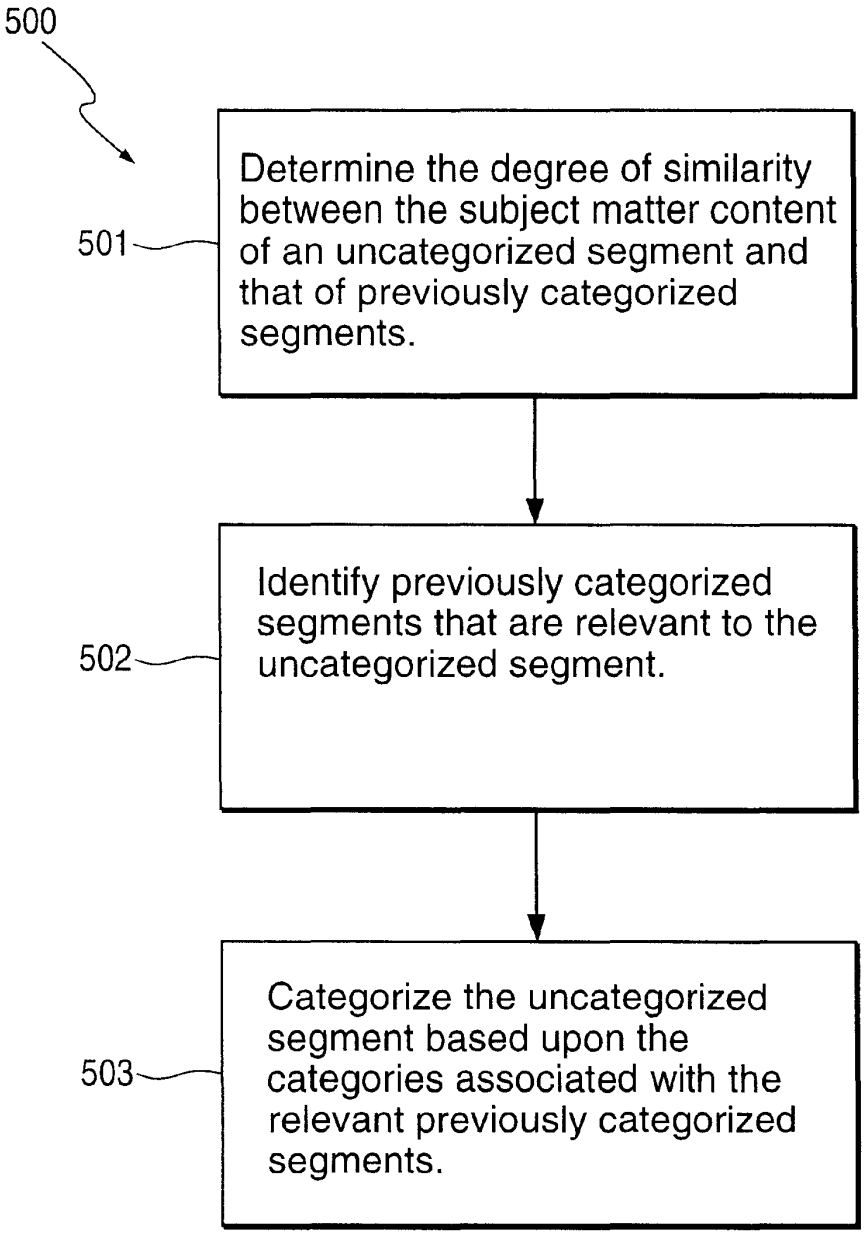
500
Determine the degree of similarity between the subject matter content of an uncategorized segment and that of previously categorized segments.
501
Identify previously categorized segments that are relevant to the uncategorized segment.
502
Categorize the uncategorized segment based upon the categories associated with the relevant previously categorized segments.
503

FIG. 5

BROWSER FOR USE IN NAVIGATING A BODY OF INFORMATION, WITH PARTICULAR APPLICATION TO BROWSING INFORMATION REPRESENTED BY AUDIOVISUAL DATA

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to systems and methods that enable observation of a body of information and, in particular, a body of information that can be represented, at least in part, by audiovisual data. Most particularly, the invention relates to systems and methods for accessing and reviewing a body of information represented by one or more sets of audiovisual data that can be used to generate an audiovisual display and one or more related sets of text data that can be used to generate a text display.

2. Related Art

The increasing complexity of the modern world, and the concomitant explosion in the amount of information available to describe that world, has placed competing demands on people. There is more subject matter that people find necessary or desirable to master or, at least, be familiar with. At the same time, there is less time to spend delving into any particular subject. Too, there is a much larger universe of information from which the desired information must be extracted. Trying to get just an overview of a large body of information can be overwhelming, and attempting to find specific material within the body of information can be like searching for a needle in a haystack.

Thus, there is a continuing and growing need for methods and systems for enabling bodies of information to be accessed and reviewed in a useful manner, e.g., a manner that allows the scope and content of available information to be quickly ascertained and that enables quick access to information of particular interest. In particular, there is a need for systems and methods of organizing, categorizing and relating the various segments of a large body of information to facilitate the access and review of the body of information. For example, while some previous systems for enabling observation of a large body of information enable identification of one or more segments of information that are related to a specified segment of information, these systems do not automatically display such related segments of information. Moreover, the previous systems either require that related segments have previously been determined or, at least, that the segments have been categorized according to subject matter content so that whether two segments are related can readily be determined. Further, previous systems have not enabled determination of relatedness between segments of information represented by different types of data, e.g., such systems cannot determine whether a segment represented by audiovisual data is related to a segment represented by text data.

There is also a need for systems and methods for enabling observation of a body of information that are user-friendly, e.g., that can be used with little training, that are convenient to use, that enable information to be quickly and easily accessed, and that present the information in an accessible format via a high quality display medium. It would also be desirable for such systems and methods to be adapted for use with bodies of information represented by different types of data (i.e., audio data, video data, text data or some combination of the three). It would further be desirable for such systems and methods to be adapted for use with bodies of information represented by data acquired from a wide variety of media (e.g., print media such as newspapers or magazines, television and radio broadcasts, online computer information services and pre-recorded audiovisual programs, to name a few). Previous systems and methods for accessing and reviewing a body of information are deficient in one or more of these respects.

For example, many previous systems are computer-based. Typically, the display device of these systems (e.g., conventional computer display monitor) does not provide a high quality display of time-varying audiovisual information (such as produced by a television, for example). On the other hand, display devices that do display such information well (e.g., televisions), typically do not provide a high quality display of text information (such as produced by a computer display monitor). A system that can provide a high quality display of both types of information is needed.

Additionally, previous systems for reviewing a body of information are not as flexible or convenient to use as is desirable. For example, in many such systems (e.g., computers), the mechanism for controlling the operation of the system is physically coupled to the display device of the system. Therefore, the system can not be operated remotely, thus constraining the user's freedom of movement while operating the system. Additionally, even in those systems where remote operation is possible (e.g., remotely controlled televisions), the remote control device often does not have a user interface that is as readily accessible as desired (as many consumer electronics users can testify, the keypads of many remote control devices are an impenetrable array of cryptic control keys, often requiring non-intuitive key combinations to effect particular control instructions) or the remote control device does not contain a rich set of control features. Moreover, the remote control devices used with previous systems do not have the capability of themselves displaying a part of the body of information.

Further, previous systems often do not enable real-time acquisition and review of some or all of the body of information. For example, many computer-based systems acquire and store data representing a body of information. The stored data can then be accessed to enable display of segments of the body of information. However, insofar as previous systems for observing a body of information allow real-time acquisition and review of the body of information, these systems generally do not analyze the data to enable the data to be organized, categorized and related so that, for example, segments of the body of information can be related to other segments for which data is acquired in the future or for which data has previously been acquired. Moreover, such systems do not enable the real-time display of some or all of a body of information while also displaying related information in response to the real-time display.

Thus, there is a need for improved systems and methods for enabling observation of a body of information and, in particular, such systems and methods that address the above-identified inadequacies in previous systems and methods for enabling observation of a body of information.

SUMMARY OF THE INVENTION

The invention enables a body of information to be displayed by electronic devices (e.g., a television, a computer display monitor) in a manner that allows the body of information to be reviewed quickly and in a flexible manner. Typically, the body of information will be represented by a set of audio data, video data, text data or some combination of the three. In a particular embodiment, the invention enables generation of an audiovisual display of one or more

segments of information, as well as a display (a text display, an audio display, a video display, or an audiovisual display), for each of the segments, of one or more related segments of information. In a particular application of the invention, referred to herein as a "news browser", the invention enables acquisition, and subsequent review, of news stories obtained over a specified period of time from a specified group of news sources. For example, as a news browser, the invention can be used to review news stories acquired during one day from several television news programs (e.g., CNN Headline News, NBC Nightly News), as well as from text news sources (e.g., news wire services, traditional print media such as newspapers and magazines, and online news services such as Clarinet™).

The invention enables some or all of a body of information to be skimmed quickly, enabling a quick overview of the content of the body of information to be obtained. The invention also enables quick identification of information that pertains to a particular subject. The invention further enables quick movement from one segment of a body of information to another, so that observation of particular information of interest can be accomplished quickly. In a news browser according to the invention, for example, each of a set of television news programs can be skimmed to quickly ascertain the subject matter content of the news stories contained therein. Additionally, a particular category (e.g., subject matter category) can be specified and news stories having content that fits within the specified subject matter category can be immediately identified and either displayed or identified as pertinent to the subject matter category and available for display. Further, a user of the news browser can move arbitrarily among news stories within the same or different news programs.

The invention also enables automatic identification of information that is related to information that is being displayed, so that the related information can be observed, thereby enabling information about a particular subject to be examined in depth. In particular, the invention enables such identification of related segments to be made between segments of different types (e.g., a segment represented by audiovisual data can be compared to a segment represented by text data to enable a determination of whether the segments are related). A portion or a representation of the related information can be displayed in response to (e.g., simultaneous with) the original information display. For instance, in a news browser according to the invention, one or more text news stories (e.g., news stories that are obtained from traditional print media or from electronic publications) that are related (i.e., which cover the same or similar subject matter) to a television news story being displayed can be automatically identified and a portion of the related text news story or stories displayed so that the story or stories can be reviewed for additional information regarding the subject matter of the television news story. Additionally, in a news browser according to the invention, one or more other television news stories that are related to a television news story being displayed can be automatically identified and a single representative video frame displayed for each such news story.

Additionally, the invention enables automatic categorization of uncategorized segments of the body of information based upon comparison to other segments of the body of information that have been categorized. In particular, the subject matter category of a segment of information can be determined by comparing the segment to one or more previously categorized segments and categorizing the segment in accordance with the subject matter categorization of one or more previously categorized segments that are determined to be relevant to the uncategorized segment. In a news browser according to the invention, for example, this can be used to categorize the news stories of a television news program based upon the categorization of text news stories that are found to be relevant to the television news stories.

The invention can be implemented in a system that is convenient to use, that presents the body of information in a readily accessible way, and that presents the information via one or more display devices that are tailored for use with the particular type of data that is used to generate the display. For example, a system according to the invention can include a control device that enables remote, untethered control of a primary display device of the system. The remote control device can also be implemented so that some or all of the body of information can also be displayed on the remote control device. The system can include, for example, a television for display of audiovisual information and a computer display monitor for display of text information.

Additionally, a control device of a system according to the invention can be implemented with a graphical user interface that facilitates user interaction with the system. For example, such an interface can include a region that provides an indication of a user's past progression through, and present location within, the body of information. In a news browser according to the invention, for example, a program map is displayed that facilitates navigation through the news programs that can be selected for display.

The invention also enables real-time acquisition and review of some or all of the body of information. The invention enables on-the-fly analysis of data as the data is acquired, so that the data can be organized, categorized and related to other data. The invention also enables the realtime display of some or all of a body of information while also displaying related information in response to the real-time display. For example, in a news browser according to the invention, television news programs can be acquired and displayed as they occur. Related news stories, either from previously acquired television news programs or text news sources can be displayed as each television news story is displayed in real time.

The invention also enables control of the manner in which the information is displayed (e.g., the apparent display rate of the display can be controlled, the display can be paused, a summary of a portion of the body of information can be displayed). For example, in a news browser according to the invention, the user can cause a summary of one or more television news stories to be displayed (rather than the entire news story or stories), the user can speed up (or slow down) the display of a television news story, and the user can pause and resume the display of a television news story such that the display resumes at an accelerated rate until the display of the news story "catches up" to where the display would have been without the pause (a useful feature when the television news story is being acquired and displayed in real time).

In one aspect of the invention, a system enables acquisition and review of a body of information that includes a multiplicity of segments that each represent a defined set of information (frequently, a contiguous related set of information) in the body of information. The system includes: i) a mechanism for acquiring data representing the body of information; ii) a mechanism for storing the data; iii) a first display mechanism for generating a display of a first segment of the body of information from data that is part of the stored data; iv) a mechanism for comparing the data representing a segment of the body of information to the data

representing a different segment of the body of information to determine whether, according to one or more predetermined criteria, the compared segments are related; and v) a second display mechanism for generating a display of a portion of, or a representation of, a second segment of the body of information from data that is part of the stored data. (A method according to the invention, and a computer readable medium encoded with one or more computer programs according to the invention, both enable similar capability.) The second display mechanism displays a portion or representation of the second segment in response to the display by the first display mechanism of a first segment to which the second segment is related The second display mechanism can display a portion or representation of the second segment substantially coextensive in time with the display of the related first segment by the first display mechanism. The system can further include a mechanism for identifying the subject matter content of a segment of the body of information, so that the mechanism for comparing can determine the similarity of the subject matter content of a segment to the subject matter content of a different segment (using, for example, relevance feedback) and use that result to determine the relatedness of the compared segments. The system can also include a mechanism for identifying an instruction from a user to begin displaying at least some of the body of information, the first display mechanism beginning display of a segment in response to the user instruction. When a portion or representation of a second segment is being displayed, the system can enable such a second segment to be selected for display by the first display mechanism. Often, the segments displayed by the first display mechanism are represented by audiovisual data (and, in particular, audiovisual data that can be used to generate an audiovisual display that can vary with time), such as, for example, data produced from television or radio broadcast signals. The segments displayed by the second display mechanism can be represented by audiovisual data (e.g., a single representative video image, or "keyframe") or by text data (e.g., text excerpts), such as, for example, data from computer-readable data files acquired over a computer network from an information providing site that is part of that network. In particular applications for which use of the invention is contemplated, the first display mechanism can be an analog display device (such as a television) and the second display means can be a digital display device (such as a computer display monitor). The system can advantageously be implemented so that the various devices are interconnected to a conventional computer bus that enables the devices to communicate with each other such that the devices do not require wire communication over network communication lines to communicate with each other (the devices are "untethered").

In another aspect of the invention, a system for reviewing a body of audiovisual information that can vary with time (e.g., the content from one or more news broadcasts) includes: i) a mechanism for displaying the audiovisual information; and ii) a mechanism for controlling operation of the system, the mechanism for controlling being physically separate from the mechanism for displaying and including a graphical user interface for enabling specification of control instructions. The mechanism can advantageously be made portable. Further, the system can advantageously include a mechanism for 2-way wireless communication between the mechanism for displaying and the mechanism for controlling. The graphical user interface can include one or more of the following: i) a playback control region for enabling specification of control instructions that control the manner in which the audiovisual information is displayed on the means for displaying; ii) a map region for providing a description of the subject matter content of the audiovisual information and for enabling specification of control instructions that enable navigation within the audiovisual information; iii) a related information region for displaying a portion of, or a representation of, a segment that is related to a segment being displayed by the mechanism for displaying; and iv) a secondary information display region for displaying a secondary information segment that is related to a segment of the audiovisual information that is being displayed by the mechanism for displaying. In particular, the playback control region can include one or more of the following: i) an interface that enables selection of one of a plurality of subject matter categories, all of the segments of the audiovisual information corresponding to a particular subject matter category being displayed in response to the selection of that subject matter category; ii) an interface that enables variation of the apparent display rate at which the audiovisual information is displayed; iii) an interface that enables specification of the display of a summary of a segment of the audiovisual information; iv) an interface that enables the display to be paused, then resumed at an accelerated rate that continues until the display of the audiovisual information coincides with the display that would have appeared had the display not been paused; v) an interface that enables termination of the current segment display and beginning of a new segment display; and vi) an interface that enables repetition of the current segment display. The map region can further identify a segment of the audiovisual information that is currently being displayed and/or identify each segment of the audiovisual information that has previously been displayed.

In still another aspect of the invention, a system enables review of a body of information, the body of information including a first portion that is represented by audiovisual data that can vary with time and a second portion that is represented by text data. The system includes a first display device for displaying the first portion of information and a second display device for displaying the second portion of information. The first display device is particularly adapted for generation of a display from time-varying audiovisual data, while the second display device is particularly adapted for generation of a display from text data. The first display device can be, for example, an analog display device such as a television. The second display device can be, for example, a digital display device such as a computer display monitor. The two devices can interact with each other so that related information can be displayed at the same time on the two devices, in the same manner as that described above.

In another aspect of the invention, a method categorizes according to subject matter a segment of a body of information (that includes a plurality of segments), the segment not previously having been categorized according to subject matter, based upon the subject matter category or categories associated with one or more previously categorized segments of the body of information. The uncategorized segment can have been acquired from a first data source (that supplies, for example, television or radio broadcast signals) and the previously categorized segment or segments can have been acquired from a second data source (that supplies, for example, computer-readable data files) that is different than the first data source. The method includes the steps of: i) determining the degree of similarity between the subject matter content of the uncategorized segment and the subject matter content of each of the previously categorized segments; ii) identifying one or more of the previously catego-

rized segments as relevant to the uncategorized segment based upon the determined degrees of similarity of subject matter content between the uncategorized segment and the previously categorized segments; and iii) selecting one or more subject matter categories with which to identify the uncategorized segment based upon the subject matter category or categories used to identify the relevant previously categorized segment or segments. (A computer readable medium encoded with one or more computer programs according to the invention enables similar capability.) The step of determining the degree of similarity can be accomplished using a relevance feedback method. The step of identifying one or more of the previously categorized segments as relevant to the uncategorized segment can include the steps of: i) identifying a multiplicity of the previously categorized segments that are the most similar to the uncategorized segment; ii) determining the degree of similarity between each of the multiplicity of previously categorized segments and each other of the plurality of previously categorized segments; iii) for each pair of previously categorized segments of the multiplicity of previously categorized segments having greater than a predefined degree of similarity, eliminating one of the pair of previously categorized segments from the multiplicity of previously categorized segments, wherein the previously categorized segment or segments remaining after the step of eliminating are similar and distinct previously categorized segments; and iv) identifying one or more of the similar and distinct previously categorized segments as relevant previously categorized segments.

In another aspect of the invention, a method determines whether a first set of information represented by a set of data of a first type (e.g., text data) is relevant to a second set of information (that is different than the first set of information) represented by a set of data of a second type (e.g., audio-visual data). The method includes the steps of: i) deriving a set of data of the second type from the set of data of the first type, the derived set of data of the second type also being representative of the first set of information; ii) determining the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information; and iii) determining whether the first set of information is relevant to the second set of information based upon the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information. (A computer readable medium encoded with one or more computer programs according to the invention enables similar capability.) The step of determining the degree of similarity can be accomplished using a relevance feedback method. Still further in accordance with this aspect of the invention, a method can determine which, if any, of a multiplicity of sets of information represented by an associated set of data of a first type (each of the multiplicity of sets of information being different from other of the multiplicity of sets of information) are relevant to the second set of information represented by the set of data of the second type. This method includes the steps of, in addition to those discussed above: i) determining the degree of similarity between each set of data of the first type representing one of the multiplicity of sets of information and the derived set of data of the first type representing the second set of information; ii) identifying which, if any, of the sets of data of the first type representing one of the multiplicity of sets of information have greater than a predefined degree of similarity to the derived set of data of the first type representing the second set of information, the sets of data of the first type so identified being termed similar sets of data of the first type; iii) determining the degree of similarity between each similar set of data of the first type and each other similar set of data of the first type; iv) for each pair of similar sets of data of the first type having greater than a predefined degree of similarity, eliminating one of the pair of similar sets of data of the first type from the set of similar sets of data of the first type, wherein the set or sets of similar data of the first type remaining after the step of eliminating are similar and distinct sets of data of the first type; and v) identifying the set or sets of information corresponding to one or more of the similar and distinct sets of data of the first type as relevant to the second set of information.

In still another aspect of the invention, a method enables the identification of the boundaries of segments in a body of information that is represented by a set of text data and at least one of a set of audio data or a set of video data, each segment representing a contiguous related set of information in the body of information. (A computer readable medium encoded with one or more computer programs according to the invention enables similar capability.) The segment boundaries are identified by first performing a coarse partitioning method to approximately locate the segment boundaries, then performing a fine partitioning method to more precisely locate the segment boundaries. In the coarse partitioning method, time-stamped markers in the set of text data are identified and used to determine approximate segment boundaries within the body of information. For each time of occurrence of an approximate segment boundary in the text data, a range of time is specified that includes the time of occurrence. Subsets of audio data or subsets of video data that occur during the specified ranges of time are extracted from the complete set of audio data or the complete set of video data. The fine partitioning method is then performed to identify one or more breaks in each of the subsets of audio data or each of the subsets of video data. The best break that occurs in each subset of audio data or each subset of video data is selected, and the time of occurrence of the best break in each subset is designated as a boundary of a segment in the body of information. The fine partitioning can be performed using any appropriate method. For example, when segment boundaries are being determined in video data, scene break identification can be used to implement the fine partitioning. When segment boundaries are being determined in audio data, the fine partitioning can be implemented by, for example, pause recognition, voice recognition, word recognition or music recognition. Once segment boundaries have been determined in the audio data or the video data, a synchronization of the audio data and the video data can be used to determine the boundaries of the segment in the other of the audio data or video data.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram illustrating a system according to the invention for acquiring and reviewing a body of information.

FIG. **2**A is a diagrammatic representation of a graphical user interface according to the invention that can be used to enable control of the operation of a system according to the invention, display information regarding operation of the system of the invention and display information acquired by the system of the invention.

FIG. **2**B is a view of an illustrative graphical user interface in accordance with the diagrammatic representation of FIG. **2**A.

FIG. **3** is a flow chart of a method in accordance with the invention for identifying the boundaries of segments in a body of information.

FIG. **4** is a flow chart of a method in accordance with the invention for determining whether a first set of information represented by data of a first type is relevant to a second set of information represented by data of a second type.

FIG. **5** is a flow chart of a method in accordance with the invention for categorizing according to subject matter an uncategorized segment of a body of information based on the categorization of other previously categorized segments of the body of information.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

I. Overview

Generally, the invention enables the acquisition of a body of information and review of the content of the body of information. In particular, the invention includes various features that facilitate and enhance review of the body of information. The invention enables the body of information to be quickly reviewed to obtain an overview of the content of the body of information or some portion of the body information. The invention also allows flexibility in the manner in which the body of information is reviewed. For example, the invention enables a user to move quickly from one segment of a body of information to another, enabling the user to rapidly begin observing particular information of interest. Further, the invention enables a user to quickly locate information within the body of information that pertains to a particular subject in which the user has an interest. The invention also enables a user to, when observing particular information, quickly find and review other information that is related to the information that the user is observing. Additionally, the invention enables the user to control the manner in which the information is displayed (e.g., the apparent display rate of the display can be controlled, the display can be paused, a summary of a portion of the body of information can be displayed). The invention also provides the user with an indication of the user's past progression through, and present location within, the body of information, such indications aiding the user in selecting further segments (described below) of the body of information for review.

The body of information can be represented by one or more sets of audio data, one or more sets of video data, one or more sets of text data or some combination of the three. Herein, "audio data" refers to data used to generate an audio display, "video data" refers to data used to generate a video display substantially including images other than text images, "text data" refers to data used to generate a video (or audio, though typically video) display of text images, and "audiovisual data" refers to data that includes audio and/or video data, and may include text data. In a particular embodiment, the invention enables the acquisition and review of one or more sets of information represented by audiovisual data, as well as related sets of information represented by text data.

For example, in a particular application of the invention, the content of one or more audiovisual news programs is acquired from a first set of one or more information sources and news stories (or "articles") from text news sources are acquired from a second set of one or more information sources. The first set of information sources could be, for example, CNN Headline News or network (e.g., ABC, NBC, CBS) news programs. The second set of information sources could be, for example, on-line news services such as Clarinet™ or news wire services such as AP or UPI. It is contemplated that this application of the invention can be particularly useful as a means of enhancing the viewing of conventional television news programs. For example, in this application, the invention can enable the user to access the news stories of audiovisual news programs in a random manner so that the user can move quickly from one news program to another, or from one news story in a news program to another news story in the same or another news program. The invention can also enable the user to quickly locate news stories pertaining to a particular subject. Additionally, when the user is observing a particular news story in an audiovisual news program, the invention can identify and display a related text news story or stories. The invention can also enable the user to control the display of the audiovisual news programs by, for example, speeding up the display, causing a summary of one or more news stories to be displayed, or pausing the display of the news stories, thereby enabling the user to quickly ascertain the content of one or more news stories or entire news programs. Additionally, the invention can indicate to the user which audiovisual news program is currently being viewed (and, further, which news story within the news program is being viewed), as well as which news stories and/or news programs have previously been viewed.

II. System Configuration

FIG. **1** is a block diagram illustrating a system **100** according to the invention for acquiring and reviewing a body of information. A user **109** interacts with a control device **101** to cause information to be displayed on a primary display device **102**. The control device **101** includes an appropriate user interface (e.g., a graphical user interface, as discussed in more detail below) that allows the user **109** to specify control instructions for effecting control of the system **100**. Communication between the control device **101** and the primary display device **102** is mediated by a system controller **103**. The system controller **103** causes primary information to be acquired from a primary information source **107** via a primary information data acquisition device **105**. Herein, "primary information" is any information the display of which the user can directly control. The system controller **103** also causes secondary information (which is typically related to the primary information) to be acquired from a secondary information source **108** via a secondary information data acquisition device **106**. Herein, "secondary information" is any information other than primary information that is acquired by a system according to the invention and that can be displayed by the system and/or used by the system to manipulate or categorize (as described in more detail below) the primary information. A data storage device **104** stores the acquired primary and secondary information. The primary information is displayed on the primary display device **102**. The secondary information can be displayed (e.g., by the control device **101** or by the primary display device **102** in addition to the primary information) or not (i.e., the secondary information may be used only for categorizing and/or manipulation of the primary information). Illustratively, the primary information can be videotape (or other audiovisual data representation) of an audiovisual news program or programs and the secondary information can be the text of news stories from text news sources.

The control device **101**, the primary display device **102**, the system controller **103** and the data storage device **104**

can be embodied in one or more devices that can be interconnected to a conventional computer bus that enables the devices to communicate with each other. In particular, the devices **101**, **102**, **103** and **104** can be integrated into a system in which the devices do not require wire communication over network communication lines to communicate with each other (one or more of the devices **101**, **102**, **103** and **104** is "untethered" with respect to one or more of the other devices **101**, **102**, **103** and **104**). Thus, once the primary and secondary information have been acquired by the system **100**, the primary and secondary information can be accessed and displayed at a relatively fast speed, thus providing quick response to control instructions from the user and enabling generation of displays with acceptable fidelity. In contrast, a networked system in which the devices must communicate with each other over a network via wire communication lines—in particular, a system in which the control device and display device or devices must communicate over such wire communication lines with the data storage device on which the information is stored—may not produce acceptable performance. In the networked system, the operation of the system is limited by the communications bandwidth and latency of the network communications medium. For example, the bandwidth of the network communications medium may not be adequate to enable transfer of data from the data storage device **104** to the primary display device **102** quickly enough to enable a display with acceptable fidelity to be generated by the primary display device **102**. Or, the response to a control instruction from the control device **101** may be undesirably slow because of inadequate speed of the network communications medium.

The primary information data acquisition device **105** and secondary information data acquisition device **106** can be implemented by any appropriate such devices. Where the primary information source **107** is comprised of television news broadcasts, for example, the primary information data acquisition device **105** can be a conventional television tuner and video capture device that acquires the data representing the primary information via conventional cable connections, satellite dish or television antenna. Where the secondary information is comprised of online text sources (i.e., text sources available over a computer network such as the Internet), for example, the secondary information data acquisition device **106** can be a conventional modem or other communications adapter, as known by those skilled in the art of data communications, that enables acquisition of data representing the secondary information via one or more conventional communication lines, such as telephone lines, ISDN lines or Ethernet connections. (It is also possible that the primary information can be acquired from online sources, such as via the Internet or other computer network.)

The primary information data acquisition device **105** and the secondary information data acquisition device **106** can communicate with the system controller **103** in any appropriate manner. As described below, the system controller **103** can be implemented as part of a digital computer. Where this is the case, the communication between the system controller **103** and the devices **105** and **106** is preferably implemented to enable computer control of the devices **105** and **106**. When the device **105** or **106** is used to acquire information over a computer network, the device **105** or **106** will be a device, such as a computer modem, for which such communication to the system controller **103** can be implemented using well-known methods and apparatus For other types of devices, such communication must be implemented in another manner. For example, when the device **105** is a television tuner, communication between the system controller **103** and the device **105** can be implemented using a VISCA (Video System Control Architecture) connection.

As will be apparent from the description below, the processing of the data representing the primary and secondary information generally requires that the data be in digital form. Text data acquired from online text sources, for example, is acquired in digital form and so can be used directly in such processing. Analog television signals, however, must be digitized before being used in digital processing. This can be accomplished using conventional A/D conversion methods and apparatus. Further, it is desirable to compress the data to increase the amount of data (i.e., primary and secondary information) that can be stored on the data storage device **104**. For example, the television data can be compressed according to the MPEG, JPEG or MJPEG video compression standards, as known by those skilled in the art of audio and video data compression. The text data can also be compressed, using conventional text file compression programs, such as PKZIP, though, typically, such compression provides a relatively small benefit because the amount of text data is small compared to the amount of audio and video data, and the amount of data required to represent the categorization information (described below). Finally, it may be desirable or necessary to transform digital data into an analog waveform again (e.g., convert digital video data into analog video data for display by a television). This can be accomplished using conventional D/A conversion methods and apparatus.

In the embodiment of the invention shown in FIG. **1**, the system **100** according to the invention makes use of two devices for display and control: a primary display device **102** for displaying the primary information and a control device **101** for controlling the operation of the primary display device **102**. Preferably, the control device **101** is physically separate from the primary display device **102** and portable so that the user has flexibility in selecting a position relative to the primary display device **102** during use of the system **100**. For example, such an embodiment could allow a user to use the invention while sitting in a chair or on a couch, reclining in bed, or sitting at a table or desk. Additionally, when the secondary information is textual (e.g., the text of news stories) and the control device **101** is used to display such secondary information, the portability of the control device **101** attendant such an embodiment increases the likelihood that the text is displayed on a device that can be held in close proximity to the user, thereby improving the ability of the user to view the text. Further, as discussed in greater detail below, the control device **101** preferably has sophisticated user interface capabilities.

As previously mentioned, a system according to the invention (including the system **100**) can be implemented so that the primary display device **102** displays the primary information while a separate device (e.g., the control device **101**) displays the secondary information. Further, as can be appreciated from the description herein, the invention can advantageously be used in situations in which the primary information is audiovisual information (and, in particular, audiovisual information that can vary with time, such as the content of a television program) and the secondary information is text information (some or all of which is, typically, likely to be related to the audiovisual information). In such an implementation of the invention, the use of two different devices for display allows the optimization of the display devices for the particular type of information to be displayed. (A system according to the invention can, in general, have any number of displays, as necessary or advantageous.) Thus, where the primary information is audiovisual

information, the primary display device **102** is preferably a device that enables high quality audio and video images (in particular, time-varying audio and video images) to be produced, such as a television. However, while a television is good for displaying audiovisual information, the television doesn't do as good a job with the display of text, particularly at typical viewing distances. A computer display monitor, on the other hand, does a good job of displaying text. Thus, a computer display monitor can be used to display the secondary information. (Herein, a "computer display monitor" can display not only video, but also audio.) In particular, a portable computer (e.g., a notebook or subnotebook computer) can advantageously be used to implement such display. Moreover, the portable computer can also be used to implement the control device **101**, thus allowing the display of the secondary information to be integrated with the user interface used to specify instructions for controlling operation of the system **100**. Where a portable computer is used to implement the control device **101**, communication between the control device **101** and the rest of the system **100** is advantageously accomplished using a wireless local area network (LAN), infrared link, or other wireless communications system, so that the user will have more freedom of movement when using the control device **101**.

The system controller **103** can be implemented by any conventional processing device or devices that can accomplish the functions of a system controller as described herein. For example, the system controller **103** can be implemented by a conventional microprocessor chip, as well as peripheral and other computer chips that can be configured to perform the functions of the system controller **103**. The data storage device **104** can be implemented by any conventional storage devices. The data storage device **104** can be implemented, for example, by a conventional computer hard disk (to enable storage of digital data, including analog data—e.g., television or radio signals—that has been digitized), a conventional videotape (to enable storage of, for example, analog data corresponding to acquired television signals) or a conventional audiotape (to enable storage of, for example, analog data corresponding to acquired radio signals). In particular, the system controller **103** and data storage device **104** can be implemented, for example, in a conventional digital computer. The devices with which the system controller **103** and data storage device **104** are implemented should have the capability to compress and decompress the audio, video and text data quickly enough to enable real-time display of that data. The system controller **103** can communicate with the control device **101** and the primary display device **102** in any appropriate manner, including wire and wireless communications.

In a particular embodiment of the invention, the control device **101** can be embodied by a portable computer (e.g., a Thinkpad™ computer, made by IBM Corp. of Armonk, N.Y.). The portable computer and associated display screen facilitate the presentation of a graphical user interface, as will be apparent from the description below. Preferably, the portable computer has a color display screen. A color display screen further facilitates implementation of a graphical user interface by enabling color differentiation to be used to enhance the features provided in the graphical user interface. The Thinkpad™ can be configured (as known by those skilled in such art) to act as an X/windows terminal (client) that communicates with an X/windows host (server), using standard X/windows protocols (as also known by those skilled in such art), to enable generation and display of the graphical user interface. In this particular embodiment of the invention, the primary display device **102**, as well as the system controller (X/windows host) **103**, can be embodied, for example, by an Indigo2 workstation computer made by Silicon Graphics Incorporated (SGI) of Mountain View, Calif. The portable computer can communicate with the SGI Indigo2 computer via a wireless Ethernet link.

Alternatively, both of the primary display device **102** and control device **101** could be implemented in a digital computer with the system controller **103** and data storage device **104** (although such an implementation may not have some of the advantages of the embodiments of the invention described above). For example, the above-mentioned SGI Indigo2 computer or an IBM-compatible desktop computer could be used to implement a system of the invention in this manner. In particular, implementation of a system according to the invention in this manner could advantageously be accomplished on a portable computer such as a notebook computer.

III. User Interface

A. Graphical User Interface

1. Overview

FIG. **2**A is a diagrammatic representation of a graphical user interface (GUI) **200** according to the invention that can be used to enable control of the operation of a system according to the invention, display information regarding operation of the system of the invention and display information acquired by the system of the invention. Generally, a GUI according to the invention can be displayed using any suitable display device. Further, when a GUI according to the invention is displayed on a display monitor of a digital computer, the GUI can be implemented by appropriately tailoring conventional computer display software, as known to those skilled in the art in view of the discussion below. For example, the GUI **200** can be displayed on the screen of a portable computer.

The GUI **200** includes four regions: primary information playback control region **201**, primary information map region **202**, related primary information region **203**, and related secondary information region **204**. It is to be understood that the regions **201**, **202**, **203** and **204** could be arranged in a different manner, have different shapes and/or occupy a greater or lesser portion of the GUI **200** than shown in FIG. **2**A. Additionally, it is to be understood that a GUI according to the invention need not include all or any of the regions **201**, **202**, **203** or **204**; it is only necessary that the GUI include features that allow the system according to the invention to be controlled. Thus, for example, a GUI according to the invention could function adequately without a related primary information region **203**. The GUI also need not, for example, include a primary information map region **202** or a primary information playback control region **201** having exactly the characteristics described below; other interfaces enabling similar functionality could also be used. The GUI could also be implemented so that user interaction with standard GUI mechanisms such as menus and dialog boxes is necessary to cause display of system controls, system operation information, and/or acquired information. For example, a GUI according to the invention could be implemented such that a display of the related secondary information region **204** is produced only upon appropriate interaction with one or more menus and/or dialog boxes.

FIG. **2**B is a view of an illustrative GUI **210** in accordance with the diagrammatic representation of FIG. **2**A. The GUI **210** is particularly tailored for use with an embodiment of the invention in which the primary information includes

videotape of one or more news programs and the secondary information includes the text of news stories from text news sources. Below, the regions **201**, **202**, **203** and **204** of the generic GUI **200** are described generally, while the corresponding regions **211**, **212**, **213** and **214** of the particular GUI **210** are described in detail.

2. Control of Primary Information Display

The primary information playback control region **201** of the GUI **200** is used to control the manner in which the primary information is displayed on the primary display device **102**. The region **201** can be used, for example, to provide a mechanism to enable the user to begin, stop or pause display of the primary information, as well as rewind or fast forward the display. The region **201** can also be used, for example, to control the particular primary information that is displayed, as well as the apparent display rate at which the primary information is displayed.

As seen in FIG. **2**B, the primary information playback control region **211** of the GUI **210** includes topic "buttons" **215**, control "buttons" **216** and a speed control **217**. It is to be understood that the functionality of the topic buttons **215**, control buttons **216** and speed control **217**, described below, could be accomplished in a manner other than that shown in FIG. **2**B and described below.

The topic buttons **215** enable the user to select a subject matter category so that, for example, all news stories in the recorded news programs that pertain to the selected subject matter category are displayed one after the other by the primary display device **102**. Alternatively, selection of a topic button **215** could cause a list of news stories pertaining to that subject matter category to appear, from which list the user could select one or more news stories for viewing. (The categorization of the primary information by subject matter category is discussed in more detail below.) The GUI **210** includes six topic buttons **215** to enable selection of news stories related to international news ("World"), national news ("National"), regional news ("Local"), business news ("Business"), sports news ("Sports"), and human interest news ("Living"); however, a GUI according to the invention can include any number of topic buttons and each button can correspond to any desired subject matter category designation.

The control buttons **216** enable the user to control which news story is displayed, as well as the manner in which a news story is displayed. Moving from left to right in FIG. **2**B, the control buttons **216** respectively cause the display to activate a dialog box that enables the user to perform a keyword search of the text of news stories acquired by the system of the invention, return to the beginning of the currently displayed story to begin displaying the story again, stop the display, start the display, and skip ahead to the next story in a predetermined sequence of stories. A GUI according to the invention can include other control buttons that enable performance of other functions instead of, or in addition to, the functions enabled by the control buttons **216**, such as fast forwarding the display, rewinding the display, pausing the display (a particular method according to the invention is described below), and displaying a summarized version of the primary information (a particular method according to the invention is described in more detail below).

The speed control **217** can be used to increase or decrease the apparent display rate with which the primary information is displayed. The speed control display **217** shows a number that represents the amount by which a normal display rate is multiplied to produce the current apparent display rate, and includes a graphical slider bar that can be used to adjust the apparent display rate. The manner in which the apparent display rate can be changed is described in more detail below.

3. Map of Primary Information Display

The primary information map region **202** of the GUI **200** provides the user with a description of the content of the primary information that is available for display, as well as information that facilitates navigation through the primary information, and can also be used to allow the user to select particular primary information for display. The description of the primary information can include, for example, an illustration or other description of the subdivision of the primary information into smaller portions (e.g., segments) of information. Such illustration or description can convey the number of portions, the length (i.e., time duration) of each portion and the subject matter of each portion. The region **202** can also be used to show the user the location within the primary information of the portion of the primary information that is currently being viewed, as well as which (if any) portions of the primary information have previously been viewed. Additionally, the region **202** can be used to enable the user to move freely among portions of the primary information by, for example, using a conventional mouse to point and click on a portion of the primary information that is illustrated in the region **202**.

As seen in FIG. **2**B, the primary information map region **212** of the GUI **210** includes several subdivided rows, each row representing a particular news program (e.g, CNN Headline News, NBC Nightly News, etc.). Each row is a map that illustrates to some level of detail the content of the corresponding news program. Each of the subdivisions of a row represent breaks during the news program, such as breaks between news stories. The region between each subdivision represents a news story (a region could also represent, for example, an advertisement). The duration of each news story is depicted graphically by the length of the region corresponding to that news story. Each region in a row can be displayed in a particular color, each color representing a particular predetermined subject matter category (i.e., topic), so that the color of each region denotes the subject matter category of the news story corresponding to that region.

The map region **212** can be further enhanced in any of a variety of ways. For example, the news program (row) that is currently being viewed can be marked, such as by, for example, shading the row of the currently viewed news program a particular color or causing a particular type of symbol to appear adjacent to the row of the currently viewed news program. Additionally, news stories that have already been viewed can be marked in an appropriate manner, such as by, for example, causing the regions of the viewed news stories to be cross-hatched or to be shaded a particular color. The current viewing location can also be shown: in FIG. **2**B, this is shown by a vertical line.

4. Related Primary Information

The related primary information region **203** of the GUI **200** displays "thumbnails" which identify segments of the primary information that are related to the primary information that is currently being displayed. Though the region **203** includes four thumbnails **203***a*, **203***b*, **203***c*, **203***d*, generally, the region **203** can be used to display any number of thumbnails. Further, the thumbnails can take any form, such as a display of a portion of the segment or a display of a representation of the segment. For example, the thumbnails **203***a*, **203***b*, **203***c*, **203***d* can be single video images that represent the video data of the segment being identified ("keyframes"). (As seen in FIG. **2**B, the related primary

information region **213** of the GUI **210** includes three single video images that each represent a news story from a news program.) Alternatively, the thumbnails **203***a*, **203***b*, **203***c*, **203***d* could be a text summary or other text identifier of the segment being identified. Or, the thumbnails **203***a*, **203***b*, **203***c*, **203***d* could be pictorial representations that identify the corresponding segment. Other possibilities exist, as known to those skilled in the art.

To enable display of thumbnails, primary information segments that are related to the primary information segment that is being displayed must be determined. A threshold of relatedness (the expression of the threshold depending upon the method used to determine relatedness) is preferably specified so that only segments that are sufficiently related to the displayed segment are displayed in the related primary information region **203**, even if that means that less than the allotted number of segments (including no segments) are displayed. If appropriate, redundant segments can be eliminated from the primary information segments to be displayed in the related primary information region **203**, using techniques similar to those described below for eliminating redundant segments from a set of segments identified as similar to a designated segment (e.g., eliminating redundant secondary information segments that are similar to a displayed primary information segment).

Identification of the relatedness of primary information segments can be accomplished by determining the degree of similarity between the primary information segment being displayed and each other primary information segment. The degree of similarity can be determined using any appropriate method, such as, for example, relevance feedback. The use of relevance feedback to determine the similarity between two segments is discussed in more detail below with respect to the determination of the relatedness of primary and secondary information segments (see, in particular, section IV.B.2. below). The use of relevance feedback necessitates that sets of text data that represent the primary information segments be created (by, for example, using a conventional speech recognition method to create a transcript of the spoken portion of the audio data set) if such sets of text data do not already exist (e.g., a closed-caption transcript).

When the thumbnails **203***a*, **203***b*, **203***c*, **203***d* are keyframes, each keyframe should be representative of the video content of the segment being identified. Each keyframe can be, for example, a video frame selected from the video data representing the segment. The keyframe can be selected from the video data in any appropriate manner.

For example, the keyframe can be a video frame that occurs at a specified location within the video data of the segment In a particular embodiment of the invention in which the primary information comprises television news stories, a video frame that occurs one tenth of the way through the video data representing the news story is selected. One tenth was chosen because it was determined empirically that video frames of particular relevance to the content of a television news story tend to occur at about that point in the television news story.

Alternatively, the keyframe can be selected based upon an analysis of the content of the video data. One method of accomplishing this is described in detail in the commonly owned, co-pending U.S. patent application entitled "A Method of Compressing a Plurality of Video Images for Efficiently Storing, Displaying and Searching the Plurality of Video Images," by Subutai Ahmad, U.S. Ser. No. 08/528,891, filed on Sep. 15, 1995, the disclosure of which is incorporated by reference herein. In that method, the content of each video frame is represented by a vector. The vector can comprise, for example, the discrete cosine transform (DCT) coefficients for the video frame, as known to those skilled in the art of video image analysis. (The DCT coefficients indicate, for example, how much objects in a video frame have moved since the previous video frame.) From the vectors for all of the video frames of the video data of the segment an average vector is determined. The keyframe is selected as the video frame that is represented by a vector that is closest to the average vector for the video data. This method of selecting a keyframe can be advantageous as compared to the arbitrary selection of a video frame that occurs at a specified location within the video data, since it is likely to result in the selection of a video frame that is more representative of the video content of the segment.

Rather than selecting a single video frame from the video data to be the keyframe, multiple keyframes can be identified from the video data and the keyframes "tiled," i.e., presented together adjacent to each other. Or, the video data can be analyzed and a composite video frame synthesized from the video data. Any technique for synthesizing a video frame or frames can be used.

The keyframe may also be a video frame or frames that are not selected from the video data. For example, a representative video image (e.g., one or more video frames) can be selected from a library of video images. For instance, a news story about baseball could be represented by a keyframe showing a batter swinging at a pitch. Such selection can be done manually, i.e., at some point, a person reviews or is made aware of the content of the segment and, based upon that knowledge, associates a video image from the library with the segment. Alternatively, such selection can be accomplished automatically (meaning, here, without human intervention, except to establish the criteria for the selection process) by analyzing the audiovisual data of the segment (e.g., with an appropriately programmed digital computer) to ascertain the content of the segment and, based upon that analysis, associating a video image from the library with the segment. The content of the segment could be determined, for example, using a categorization method as described in more detail below. The segment to be categorized could either be compared to previously categorized segments that can be displayed by the system of the invention, or to a library of "control segments", each of which contain words germane to a particular subject.

The GUI **200** can be implemented, using conventional interface methods, so that a user of a system of the invention can select (e.g., by pointing and clicking with a mouse) one of the thumbnails **203***a*, **203***b*, **203***c*, **203***d* to cause the corresponding primary information segment to be displayed. (The map in the primary information map region **202** is adjusted accordingly.)

5. Related Secondary Information

The related secondary information region **204** of the GUI **200** provides the user information from a secondary information source or sources, the secondary information being related to the primary information currently being displayed. Though the region **204** includes two secondary information displays **204***a*, **204***b*, generally, the region **204** can include any number of secondary information displays. Further, as with the thumbnails **203***a*, **203***b*, **203***c*, **203***d* of the related primary information region **203**, the secondary information displays **204***a*, **204***b* can take any form. For example, the secondary information displays **204***a*, **204***b* could be single video images, moving video images or sets of text. (As shown in FIG. **2**B, the related secondary information region **214** of the GUI **210** includes three sets of text that each are a story from a text news source.) Other possibilities exist for

the secondary information displays **204***a*, **204***b*, as known to those skilled in the art. As the segment of primary information being displayed changes, the secondary information displays **204***a*, **204***b* typically change as well. As indicated above, segments of secondary information that are related to the primary information that is being displayed can be identified in a manner discussed in more detail below. The system according to the invention can also be implemented so that the user can cause various parts of the secondary information displays **204***a*, **204***b* to be displayed, e.g., the user can be enabled to scroll up and down through a set of text or move back and forth through a video clip, using conventional GUI tools such as mouse pointing and clicking.

B. Other User Interface Techniques

User interface techniques other than GUI can be used with the invention. For example, rather than using GUI "buttons" (as illustrated in the primary information playback control region **211** of the GUI **210** of FIG. **2**B), the manner in which the primary information is displayed could be controlled using a rotating knob device. Rotation of the knob in one direction could cause the display of the primary information to move forward (play); rotation of the knob in the other direction could cause the display of the primary information to move backward (rewind). Further, the knob could be constructed so that as the knob is rotated the user feels detents at certain points in the rotation. Each detent could correspond to a particular apparent display rate of the display. For example, when the knob is positioned in a home position, the display is stopped. When the knob is rotated clockwise, the display moves forward, the first detent in the clockwise direction causing the display to occur at a normal display rate, the second detent specifying a target apparent display rate of, for example, 1.5 times the normal display rate, the third detent specifying a target apparent display rate of, for example, 2.0 times the normal display rate, and so on. Similarly, when the knob is rotated counterclockwise, the display moves backward (i.e., in a chronological direction opposite that in which the display normally progresses). The first detent corresponds to normal display rate, the second detent specifies a target display rate of, for example, 1.5 times the normal display rate, and so on. The maximum rotation of the knob in either direction could be limited, the maximum rotation corresponding to a maximum target apparent display rate. The knob could be positioned at any position in between, thus allowing the target apparent display rate to be varied continuously between the maximum forward and backward display rates. The knob could also include a centrally located pushbutton to, for example, enable skipping from the display of one segment of the primary information to a next segment of the primary information. The knob could be constructed so that the position of the knob (or activation of the pushbutton) is transmitted to the remainder of the system using wireless communications, thus providing the user with relatively large freedom of movement during use of the system.

IV. Processing of Obtained Information

A. Information Acquisition

1. In General

Returning to FIG. **1**, the system controller **103** causes data to be acquired from the primary information source **107** and the secondary information source **108**, as described above. The data is acquired using methods and apparatus that are appropriate to the type of data being acquired. For example, the system controller **103** can acquire data representing television broadcasts using conventional equipment for receiving (e.g., a television set and antenna) and recording (e.g., a conventional videocassette recorder) television signals. Or, the system controller **103** can acquire data representing radio broadcasts using conventional equipment for receiving (e.g., a radio and antenna) and recording (e.g., a conventional audiotape recorder) radio signals. Or, the system controller **103** can acquire computer-readable data files (that can include text data, audio data, video data or some combination of two or more of those types of data), using conventional communications hardware and techniques, over a computer network (e.g., a public network such as the Internet or a proprietary network such as America Online™, CompuServe™ or Prodigy™) from an information providing site that is part of that network. In one particular embodiment of the invention, the system controller **103** acquires primary information including the television signals representing the content of designated television news broadcasts, and secondary information including computer-readable data files that represent the content of designated news stories from text news sources.

The data can be acquired according to a pre-established schedule (that can be stored, for example, by the data storage device **104**). Data can be acquired at any desired frequency and the scheduled acquisition times specified in any desired manner (e.g., hourly, daily at a specified time, weekly on a specified day at a specified time, or after the occurrence of a specified event). The schedule can be used, for example, to program a videocassette recorder to record particular television programs at particular times. Likewise, the schedule can be used, for example, to appropriately program a computer to retrieve desired data files from particular network sites (e.g., by specifying an appropriate network address, such as a URL) of a computer network at specified times. In the latter case, if the device with which the system controller **103** is implemented is not operating (e.g., the computer is not turned on) at a time when a scheduled acquisition of data is to take place, the system controller **103** can be implemented so that all such data is immediately retrieved upon beginning operation of the device (e.g., turning the computer on). Further, connection over the network to the site or sites from which data is to be obtained can be accomplished by, for example, inserting a communications daemon into a startup file that is executed at the beginning of operation of the operating system of a computer used to implement the system controller **103**. For example, if the computer uses a Windows operating system, the daemon can initiate a WinSock TCP/IP connection to enable connection to be made to the network site.

The acquired data must be stored. As indicated above, analog data (such as television or radio signals) can be stored on an appropriate medium, such as videotape or audiotape. Additionally, some or all of the data acquired by a system according to the invention is, if not already in that form, converted to digital data. The digital data can be stored on a conventional hard disk having adequate capacity, as described above. To minimize the amount of data storage capacity required, the digital data can be compressed using conventional techniques and equipment. Illustratively, a half hour television news program requires approximately 250 MB of hard disk storage capacity when the video is recorded using Adobe Premiere with Radius Studio compression at 15 fps and "high" quality capture at 240×180 resolution, and the audio is recorded at approximately 22 kHz.

Appropriate rules can be established to handle situations in which the data storage device **104** (whether single or multiple devices) has insufficient data storage capacity to

store new data. For example, the oldest data can be deleted, as necessary, to make room for new data. For example, in the particular embodiment of the invention in which the primary information is the content of designated television news programs and the secondary information is the content of designated text news stories, as new television news programs are recorded, the oldest stored programs can be deleted as necessary to make space to store the new programs, and text stories that are older than a specified length of time (e.g., several days) are automatically deleted.

The GUI **200** (FIG. **2**A) can also include a mechanism for enabling the user to specify the particular information desired, i.e., specify particular information providers (e.g., news networks, such as CNN, NBC, ABC or CBS, or information services, such as Clarinet™) and data acquisition schedules for both the primary information source **107** and the secondary information source **108**. This could be implemented, for example, using a set of nested menus, as known by those skilled in the art.

2. Recording/Playback Mediation

A system according to the invention may be instructed to acquire new information at the same time that the system is instructed to display other information. However, limitations of the devices or configuration of the system of the invention can impede or prevent such simultaneous acquisition and display. For example, the operating speed of a hard disk used to store the data describing the acquired information can limit the capacity of the system for such simultaneous operation: for typical amounts of audiovisual data, current conventional hard disks may not operate at a speed that is adequate to enable the simultaneous storing of data to, and accessing of stored data from, the hard disk.

Thus, in one embodiment of the invention, when data acquisition is scheduled to begin at a time when the system of the invention is being used for information display, a conventional graphical user interface mechanism (e.g., a dialog box) is used to alert the user of the system to the conflict and offer a choice between continuing with the display (thus delaying or eliminating the data acquisition) or ending the display and allowing the data acquisition to occur.

In another embodiment of the invention, the user can be alerted oL an impending data acquisition at some predetermined time before the data acquisition is scheduled to begin. Similar to the choice described above, the user can be presented with a choice to continue with the display at that time or allow the data acquisition to occur. The system of the invention can default to one or the other modes of operation (i.e., data acquisition or display) if the user does not make a selection.

Or, the hard disk operating speed limitation described above can be alleviated or overcome by using multiple hard disks so that if data acquisition begins at a time when data is being accessed for use in generating a display, the newly acquired data is stored to a hard disk that does not contain any previously stored data (or that, based upon evaluation of one or more predetermined rules, does not contain data that is expected to be accessed during the time that the new data is being acquired), thus ensuring that data access and data storage will not occur simultaneously for a single hard disk. Alternatively, the hard disk operating speed limitation can be addressed by using only some portion of the available data to generate the information display, thus freeing more time for use in storing data to the hard disk. However, this latter approach may decrease the fidelity of the display unacceptably.

In a similar approach to the two hard disk approach described above, the data being acquired can be stored on a data storage device of one type, while the data to be used for generating a display is accessed from a data storage device of another type. For example, incoming television signals could be stored on a videocassette tape by a VCR, while digital data from previous television transmissions is retrieved from a hard disk for use in generating a television display of the previously acquired data. The data recorded by the VCR could be digitized at a later time and stored on the hard disk for subsequent use (which use may also occur at a time at which incoming television signals are being acquired by the VCR).

B. Information Structuring

Typically, the data representing the primary and secondary information are not provided from the primary and secondary information sources in a form that enables the various aspects of the invention described herein to be realized. Thus, it is necessary or desirable to "structure" the data (i.e., to organize and categorize the data, and relate particular data to other data) in useful ways. Below are described several aspects of such data structuring that can be implemented as part of the invention.

1. Partitioning

The primary and secondary information can be, and typically are, divided ("partitioned") into smaller related sets of information of particular utility for the invention is the identification within the primary and secondary information of contiguous related sets of information that typically concern a single theme or subject and that can be delineated in some manner from adjacent information. Herein, each such contiguous related set of information can be referred to as a "segment" of the primary or secondary information. (Note that, in the description below—see section IV.C.1.—of skimming an audiovisual display, "segment" is used in a different way; there, "segment" represents a contiguous portion of a set of audio data that occurs during a specified duration of time.) Segments within the primary information are "primary information segments" while segments within the secondary information are "secondary information segments." For example, if the primary information includes the content of several news programs, the primary information can be divided into particular news programs and each news program can further be broken down into particular news stories within the news program, each news story being denoted as a segment. Similarly, if the secondary information includes content from several text sources, the secondary information can be divided into particular text sources and each text source can be further divided into separate text stories, each text story being denoted as a segment. Note that a "segment" may sometimes, strictly speaking, not be contiguous in time (though it is contiguous in content). For example, a news story that is interrupted by a commercial break, then continues after the commercial break, may be defined as a single segment, particularly if the body of information is modified so that commercial breaks—and other extraneous portions of the body of information—are eliminated (an approach that, generally, is preferred, though such portions could also be treated as segments).

Partitioning the primary and secondary information into segments is useful for a variety of reasons For example, each segment of the primary information can be identified within the data storage device which stores the data representing the primary information, in a manner known by those skilled in the art (e.g., by maintaining a table of segment identifiers and associated locations of the beginning of the identified segment), thus enabling the primary information segments to be accessed randomly so that the user can change the displayed segment freely among the primary information

segments. Such identification of primary information segments also enables the creation of the map region **202** of the GUI **200** (FIG. **2**). Further, each segment of the primary information can be correlated, as described in more detail below, with segments of the secondary information, thereby enabling one or more secondary information segments that are sufficiently related to a primary information segment to be displayed at the same time that the primary information segment is displayed. As also described in more detail below, the correlation of primary information segments with secondary information segments can also be used to categorize the primary information segments according to subject matter, thus enabling the user to sort or to cause display of segments of the primary information that pertain to a particular subject matter category (see the discussion of the topic buttons **215** in the playback control region **211** of the GUI **210** shown in FIG. **2**A).

Generally, partitioning of a set of data requires some analysis of the data to identify "breaks" within the data, i.e., differences between adjacent data that are of sufficient magnitude to indicate a significant change in the content of the information represented by the data. A break may signify a demarcation of one segment from another, but need not necessarily do so: a break may also signify, for example, a change in the video image within a segment or a change of speakers within a segment. Methods for enabling identification of breaks that constitute segment demarcation are discussed in more detail below.

Partitioning of text data is often straightforward. For example, bodies of information that are collections of segments (e.g., stories) from text sources that are represented as computer-readable data typically include markers that identify the breaks between segments. Similarly, text transcripts of bodies of information represented as a set of audiovisual information also frequently include markers that identify breaks between segments of the information. For example, closed caption text data that can accompany the audio and video data of a set of audiovisual data often includes characters that indicate breaks in the text data (most news broadcasts, for example, include closed caption text data containing markers that designate story and paragraph boundaries, the beginning and end of advertisements, and changes in speaker) and, in particular, characters that explicitly designate breaks between segments (e.g., markers that identify story boundaries). Partitioning of such text data, then, requires only the identification of the location (e.g., if the text transcript of a set of audiovisual data is time-stamped, the time of occurrence) of the markers within the text data.

Where such markers are not present, the text data can be partitioned based upon analysis of the content of the text data. In a set of audiovisual data, breaks between segments can be determined, for example, based upon identification of the occurrence of a particular word, sequence of words, or pattern of words (particularly words that typically indicate a transition), and identification of changes in speaker. As one illustration, in a news program, phrases of the form, "Jane Doe, WXYZ news, reporting live from Anytown, USA," can indicate a break between segments.

Partitioning of audio and video data typically requires some non-trivial analysis of the data. The partitioning of audio and video data in accordance with the invention can be accomplished in any suitable manner. Some examples of methods that can be used to accomplish partitioning of audio or video data are described below. (These methods are applicable to digital data; thus, if the primary information is initially analog, it must be digitized before partitioning.) Typically, the audio and video data are synchronized as a result of having been recorded together. Thus, partitioning of either the audio or the video data will result in a corresponding partitioning of the other of the audio and video data. However, if the audio and video data are not synchronized, then such synchronization must be accomplished, in addition to partitioning one of the audio or video data, so that the other of the audio and video data can be partitioned in like manner.

Partitioning of audio data can be accomplished in any of a number of ways. For example, the audio data can be partitioned using a known voice recognition method. A voice recognition method that could be used with the invention is described in "A Gaussian Mixture Modeling Approach to Text-Independent Speaker Identification," by Douglas Reynolds, PhD thesis, Dept. of Electrical Engineering, Georgia Institute of Technology, 1992, the disclosure of which is incorporated by reference herein. Voice recognition methods can be tailored to, for example, identify a break in the audio data when a particular voice speaks, when a particular sequence of voices speak, or when a more complicated occurrence of voices is identified (e.g., the occurrence of two voices within a specified time of each other, or the occurrence of a voice followed by a silence of specified duration). Illustratively, when the invention is implemented as a news browser, a break between news stories could be identified when a particular newscaster's voice is followed or preceded by a silence of specified duration.

Or, the audio data can be partitioned using a known word recognition method. For example, a conventional speech recognition method (a large variety of which are known to those skilled in that art) can be used to enable identification of words. The identified words can then be analyzed in the same manner as that described above for analysis of text data, e.g., transition words or speaker changes can be used to indicate breaks. Illustratively, when the invention is implemented as a news browser, a break between news stories could be identified when one of a set of particular word patterns occurs (e.g., "we go now to", "update from", "more on that").

Audio data can also be partitioned using music recognition, i.e., a break is identified when specified music occurs. A method for partitioning audio data in this way is described in detail in the commonly owned, co-pending U.S. patent application entitled "System and Method for Selective Recording of Information," by Michelle Covell and Meg Withgott, U.S. Ser. No. 08/399,482, filed on Mar. 7, 1995, the disclosure of which is incorporated by reference herein. Partitioning of audio data using music recognition can be particularly useful when transitions between segments of the body of information are sometimes made using standard musical phrases. Illustratively, when the invention is implemented as a news browser, music recognition can be used to partition certain news programs (e.g., The MacNeil/Lehrer news hour) which use one or more standard musical phrases to transition between news stories.

Another method for partitioning audio data is pause recognition. Pause recognition is based on the assumption that a pause occurs at the time of a significant change in the content of the primary information. For many types of information, such as news programs, this is a workable assumption. A break is identified each time a pause occurs. A pause can be defined as any period of silence having greater than a specified magnitude.

Video data can be partitioned, for example, by searching for scene breaks, a method similar to the pause recognition

method for partitioning audio data discussed immediately above. One method of accomplishing this is described in detail in the above-mentioned U.S. patent application entitled "A Method of Compressing a Plurality of Video Images for Efficiently Storing, Displaying and Searching the Plurality of Video Images," by Subutai Ahmad. In that method, the content of each video frame is represented by a vector, as described above. The vector for each video frame is compared to the vector of the immediately previous video frame and the immediately subsequent video frame, i.e., vectors of adjacent video frames are compared. In one approach, a break is identified each time the difference between the vectors of adjacent video frames is greater than a predetermined threshold. In another approach, a predetermined number of partitions is specified and the video frames are partitioned to produce that number of partitions (the partitioning can be accomplished by considering each video frame to be initially partitioned from all other video frames and recursively eliminating the partition between partitioned video frames having the least difference, or considering none of the video frames to be partitioned and recursively establishing partitions between unpartitioned video frames having the greatest difference).

Other approaches to scene break identification could be used, as known by those skilled in the art of processing video images. Some other approaches to scene break identification are discussed in "Automatic Parsing of News Video," by HongJiang Zhang, Gong Yihong, Stephen W. Smoliar, and Tan Ching Yong, IEEE Conference on Multimedia Computing and Systems, Boston, May 1994, the disclosure of which is incorporated by reference herein. For example, scene breaks could be identified based upon the magnitude of the overall changes in color of the pixels of adjacent video frames (a color change having a magnitude above a specified threshold is identified as a scene break). Or, scene breaks could be identified based upon the magnitude of the compression ratio for a particular set of adjacent video frames (a relatively small amount of compression indicates a relatively large change between video frames and, likely, a change in scenes, i.e., a scene break).

The above-described methods for partitioning audio or video data directly may not, by themselves, enable identification of segment breaks to be accomplished easily or at all. For example, without augmentation, pause recognition or scene break identification typically are not implemented in a manner that enables distinguishing between segment breaks and other breaks. Voice recognition may not, alone, be a reliable indicator of segment breaks, since switches in speaker often occur for reasons unrelated to a segment break. Word recognition, too, may be erratic in determining segment breaks; it also requires obtaining a text transcript of the audio. Music recognition works well only with a limited number of information sources, i.e., information sources that use well-defined musical transitions.

It may be possible to include markers (similar to those discussed above with respect to closed caption text data) in either audio or video data that directly identify segment or other breaks within the audio or video data. The invention contemplates use of such markers to segment audio and/or video data.

If a set of audiovisual data also includes text data (e.g., a closed caption transcript of the spoken audio), it is possible to partition the audiovisual data by partitioning the text data, then using the partitioned text data to partition the audio data and video data in a corresponding manner. Even if the audiovisual data does not initially include text data, the text data can be produced using a speech recognition method. The text data can be partitioned using any appropriate method, as described above.

Typically, the text data, audio data and video data are each time-stamped. Theoretically, then, once segment breaks are determined in the text data, the time-stamps of the beginning and end of each segment within the text data could be used directly to identify segment breaks within the audio data and/or video data. However, in practice, the text data is typically not exactly synchronized with the audio data and video data (e.g., the text data of a particular segment may begin or end several seconds after the corresponding audio or video data), making such a straightforward approach infeasible. Nevertheless, the time-stamps of the segment breaks in the text data can be used to enable synchronization of those segment breaks with the corresponding segment breaks in the audio and video data. Such synchronization can be accomplished using any appropriate technique. Some possible approaches are described below.

One way to partition the audio and video data based upon the partition of the text data is to use a synchronization of the complete set of audio data with the complete set of text data, and a synchronization of the complete set of audio data with the complete set of video data to identify the partitions in the audio and video data. The latter synchronization typically exists as a consequence of the manner in which the audio and video data is obtained. However, synchronization between the text data and the audio data frequently does not already exist, and, if it does not, obtaining such synchronization can be computationally expensive. Further, it is not necessary to synchronize all of the text data with the audio and video data, but, rather, only the locations of the segment breaks.

A simpler approach is to determine the segment breaks in the audio and video data from the segment breaks in the text data based upon a rule or rules that exploit one or more characteristics of the body of information. Such a rule might be based on an observation that segment breaks in the audio and/or video data of a set of audiovisual data bear a relatively fixed relationship to the corresponding segment breaks in the corresponding text data. For example, it was observed that the video data of a news story from an audiovisual news program frequently begins about 5 to 10 seconds before the closed caption text data of the news story. Thus, in one embodiment of news browser implementation of the invention, the beginning of the video data of a news story is assumed to be 4 seconds prior to the closed-caption text data. This enables most of the relevant video data to be captured, while reducing the possibility of capturing extraneous video. This approach was found to be accurate within 2 seconds for CNN Headline News and the news programs of the NBC, ABC and CBS television broadcasting networks.

In some cases, the approach may still not produce as good a result as desired, i.e., the segmentation of the audio and video data is not as crisp as desired, either deleting part of the beginning or end of the audio or video segment, or including extraneous audio or video as part of the segment. Thus, according to another particular embodiment of the invention, partitioning of audiovisual data that includes text data in which segments breaks are explicitly designated by markers within the text data can be accomplished in two steps: a first, coarse partitioning followed by a second, fine partitioning. FIG. **3** is a flow chart of a method **300**, in accordance with this aspect of the invention, for identifying the boundaries of segments in a body of information. In the coarse partitioning step **301** of the method **300**, the time-stamps associated with the segment breaks in the text data

can be used to approximate the location of the corresponding segment breaks in the audio and video data, as described above. In step **302**, a window of data (e.g., audio or video data in the context of the current discussion) that includes the approximate segment boundary is specified. This can be accomplished, for example, by specifying a time range that includes the time associated with the segment break in the text data (e.g., the time of occurrence of the segment break in the text data plus or minus several seconds) and identifying audio and/or video data that falls within that time range from the time-stamps associated with the audio and/or video data. The fine partitioning step **303** can then be used to identify breaks within the audio and/or video data. The fine partitioning can be accomplished using any appropriate method, such as one of the above-discussed methods (i.e., scene break identification, pause recognition, voice recognition, word recognition, or music recognition) to identify breaks in audio and video data. The fine partitioning can be performed on the entire set of audio data or video data, or only on the audio or video data that occurs within the time range. In the step **304**, the data within the time range can then be examined to identify the location of a break or breaks within the time range. If more than one break is identified, the "best" break, measured according to the criteria of the partitioning method used, can be identified as the segment break, or the break occurring closest in time to the approximate segment break can be identified as the segment break.

Once the segment breaks in the audio or video data are identified, segment breaks in the other of the audio or video data can be determined using a synchronization of the audio and video data, as discussed above. Pointers to the segment breaks in the text data, audio data and/or video data can be maintained to indicate the beginning and end of each segment, thus enabling random access to segments within a body of information (e.g., news stories within a news program), as discussed in more detail above. The identified segments can also be used to enable other features of the invention, as described in more detail below.

2. Correlation

As mentioned above, the related secondary information region **204** of the GUI **200** is used to provide the user, from a secondary information source or sources, information that is related to the primary information currently being displayed. Thus, it is necessary to determine which of the segments of the secondary information are sufficiently related to the primary information segment displayed on the primary display device **102** to be displayed in the related secondary information region **204**. This can be accomplished by determining the degree of similarity between each segment of the primary information (e.g., news story from an audiovisual news program) and each segment of the secondary information (e.g., text story from a text news source), and displaying in the related secondary information region **204** of the GUI **200** certain secondary information segments that are most similar to the primary information segment that is being displayed by the primary display device **102**.

An important aspect of the invention is the capability to determine relatedness of segments of information represented by two different types of data. In particular, the invention can enable the determination of relatedness between segments of information represented by audiovisual data (such as is frequently the case for the primary information that can be displayed by the invention) and segments represented by text data (such as is generally the case for the secondary information as described particularly herein). This aspect of the invention enables the display of the related secondary information region **204** to be generated. It can also enable categorization of uncategorized segments, as described further below.

FIG. **4** is a flow chart of a method **400**, in accordance with this aspect of the invention, for determining whether a first set of information represented by a first set of data of a first type (e.g., audiovisual data) is relevant to a second set of information represented by a second set of data of a second type (e.g., text data). In step **401**, a set of data of the second type is derived from the first set of data of the first type. In a typical application of the method **400**, step **401** causes a set of text data to be produced from a set of audiovisual data. The set of text data can be produced in any appropriate manner. For example, "production" of the set of text data may be as simple as extracting a pre-existing text transcript (e.g., a closed caption transcript) from the set of audiovisual data. Or, the set of text data can be produced from the set of audio data using a conventional speech recognition method. In step **402**, the derived set of data (of the second type) is compared to the second set of data of the second type to determine the degree of similarity between the derived set of data and the second set of data. One way of making this determination is described in more detail below. In step **403**, a determination is made as to whether the first set of data is relevant to the second set of data, based on the comparison of step **402**. Typically, a threshold level of similarity (the expression of which depends upon the method used to determine similarity) is specified so that only sets of information that are sufficiently related to each other are identified as related. (This means, when the method **400** is used to generate the related secondary information region **204**, that less than the allotted number of secondary information segments—or even no secondary information segments—may be displayed.)

The degree of similarity can be determined using any appropriate method, such as, for example, relevance feedback. In relevance feedback, a text representation of each segment to be compared (e.g., each audiovisual news story or text story) is represented as a vector, each component of the vector corresponding to a word, the value of each component being the number of occurrences of the word in the segment. (Two words are considered identical—i.e., are amalgamated for purposes of ascribing a magnitude to each component of the vector representing the textual content of a segment—if the words have the same stem; for example, "play", "played" and "player" are all considered to be the same word for purposes of forming the segment vector.) For each pair of segments, the normalized dot product of the vectors corresponding to the segments is calculated, yielding a number between 0 and 1. The degree of similarity between two segments is represented by the magnitude of the normalized dot product, 1 representing two segments with identical words and 0 representing two segments having no matching words. The use of relevance feedback to determine the similarity between two text segments is well-known, and is described in more detail in, for example, the textbook entitled *Introduction to Modern Information Retrieval*, by Gerard Salton, McGraw-Hill, New York, 1983, the pertinent disclosure of which is incorporated by reference herein. Relevance feedback is also described in detail in "Improving Retrieval Performance by Relevance Feedback," Salton, G., Journal of the American Society for Information Science, vol. 41, no. 4, pp. 288–297, June 1990 as well as "The Effect of Adding Relevance Information in a Relevance Feedback Environment," Buckley, C. et. al., Proceedings of 17th International Conference on Research and Development in

Information Retrieval, DIGIR 94, Springer-verlag (Germany), 1994, pp. 292–300, the disclosures of which are incorporated by reference herein.

The related secondary information region **204** of the GUI **200** can display a predetermined number of relevant secondary information segments. Generally, it is desirable to display the secondary information segments that are most similar to the primary information segment that is being displayed. While this can be accomplished straightforwardly by displaying those secondary information segments having the highest determined degree of similarity, such an approach may not be desirable in some situations. For example, the secondary information source may include segments that are identical or nearly identical (e.g., news stories are often repeated in a variety of text news sources with little or no change), so that display of the secondary information segments having the highest determined degree of similarity can result in undesirable redundancy.

This problem can be overcome by further determining the degree of similarity between each of a predetermined number of the secondary information segments having the highest determined degree of similarity (in one embodiment of the news browser implementation of the invention, the 10 most similar text stories are compared), and displaying only one of each pair of secondary information segments having a degree of similarity above a specified threshold, i.e., redundant secondary information segments are eliminated. Again, this can be more problematic than first appears. For example, a particular segment may have greater than the threshold degree of similarity when compared to each of second and third segments, but the second and third segments may have less than the threshold degree of similarity when compared to each other. From the three segments, it would be desirable to show both the second and third segments. However, if the first segment is compared to the second segment or the third segment, and the second or third segment discarded, before comparison of the first segment to the other of the second or third segment (which will also result in discarding of one of the compared segments), then only one of the three segments will be shown. Such a situation could be handled by, for example, calculating the similarity between all pairs of the predetermined number of secondary information segments, and performing comparisons that reveal the situation described above before discarding any of the secondary information segments.

3. Categorizing

An important aspect of the invention is the capability to categorize uncategorized segments of information based upon the categorization of previously categorized segments of information. In particular, if the segments of the secondary information have been categorized according to subject matter, then the degree of similarity between the subject matter content of segments of the primary information (e.g., news stories in audiovisual news programs) and segments of the secondary information (e.g., news stories from text news sources) can also be used to categorize the primary information according to subject matter. This can be useful to enable determination of which primary information segments fall within a particular subject matter category that corresponds to one of the topic buttons **215** (FIG. **2**) that a user can select to cause all primary information segments that pertain to the selected subject matter category to be displayed one after the other by the primary display device **102** (FIG. **1**). Though this aspect of the invention has particular utility in categorizing primary information segments based upon the categorization of pre-existing secondary information segments, it can generally enable any categorized segments to be used to categorize uncategorized segments.

FIG. **5** is a flow chart of a method **500**, in accordance with this aspect of the invention, for categorizing according to subject matter an uncategorized segment of a body of information based on the subject matter categorization of other previously categorized segments of the body of information. For example, each story from the Clarinet™ news service is categorized according to the subject matter of the story by associating one or more predefined subject matter categories (e.g., sports, travel, computers, business, international news) with the story. This subject matter categorization can be used to categorize news stories from audiovisual news programs based on the similarity between each audiovisual news story and text stories from the Clarinet™ news service. Below, such categorization of audiovisual news stories is described as an example of how categorizing segments of primary information can be accomplished in accordance with the invention.

The subject matter category or categories associated with each Clarinet™ text story are acquired as part of the acquisition of the text stories themselves and can, for example, be stored in a relational database in a memory that is part of the system controller **103** (FIG. **1**). It may be desirable to associate only one subject matter category with each text story. For example, the most salient subject matter category can be identified in any appropriate manner and used as the sole subject matter category associated with the story. This may be done., for example, to increase the likelihood that the subject matter category eventually associated with each news story accurately describes the subject matter content of that news story.

In step **501** of the method **500**, a determination is made as to the degree of similarity between the subject matter content of an uncategorized segment and that of previously categorized segments. The degree of similarity can be determined using any appropriate method, such as, for example, relevance feedback. When relevance feedback is used, it is necessary to obtain a textual representation of audiovisual data, if appropriate (i.e., if one or both of the segments is represented as audiovisual data) and not already existent.

In step **502**, previously categorized segments that are relevant to the uncategorized segment are identified. Relevant segments can be identified based upon the degree of similarity in the same manner as that described above with respect to correlation of segments, e.g., segments having greater than a threshold level of similarity can be designated as relevant. Step **501** can also include elimination of redundant segments (in the same manner as described above) from among those that have the required degree of similarity to the uncategorized segment.

In step **503**, the uncategorized segment is categorized based upon the subject matter categories associated with the relevant previously categorized segments. One or more subject matter categories can be associated with the uncategorized segment. Generally, the subject matter category or categories can be selected from the subject matter categories associated with the relevant previously categorized segments using any desired method. For example, the subject matter category or categories of the most similar previously categorized segment could be selected as the subject matter category or categories of the uncategorized segment. Or, the most frequently occurring subject matter category or categories associated with a predefined number of the most similar previously categorized segments (or previously categorized segments having greater than a threshold degree of similarity) could be selected as the subject matter category of the uncategorized segment. In the latter case, it may be particularly desirable, as described above, to determine the

similarity between the relevant previously categorized segments, so that only one of a set of previously categorized segments that are substantially identical to each other influences the categorization of the uncategorized segment.

C. Information Presentation

Above, the acquisition of information and the structuring of acquired information has been described. The information must, of course, also be displayed to a user. The information display has been described generally above with respect to FIGS. **2**A and **2**B. However, a system according to the invention can also include one or more of a variety of additional features that enhance the information display.

1. Skimming

As indicated above with respect to FIGS. **2**A and **2**B, the apparent display rate with which the primary information is displayed by the primary display device **102** can be varied by the user. Variation in the apparent display rate of an audiovisual display can be implemented by appropriately programming a digital computer to accomplish the functions of a method for varying the apparent display rate. Generally, any method for varying the apparent display rate can be used with the invention. As described elsewhere herein, the primary information will often be represented by coextensive sets of data of several types (audio, video and, possible text). The particular method used to vary the apparent display rate of the primary information will typically depend upon the type of the set of data (e.g., audio, video, text) that is directly modified to produce appropriately modified data for use in generating a display of the primary information at the new apparent display rate. The method also preferably synchronizes the sets of data that are not directly modified with the set of data that is.

For example, the audio data can be modified to cause the apparent display rate of the audio display to be varied (either slowed down or speeded up) from a normal display rate and the video data synchronized with the modified audio data (resulting in a variation of the apparent video display rate that corresponds to the variation in the apparent audio display rate). Several methods of accomplishing such variation in the apparent display rate of an audiovisual display are described in detail in the commonly owned, co-pending U.S. patent application entitled "Variable Rate Video Playback with Synchronized Audio," by Neal A. Bhadkamkar, Subutai Ahmad and Michelle Covell, attorney docket number I0359-991160, filed on the same day as the present application, the disclosure of which is incorporated by reference herein. At least some of the methods described therein have the advantage that the apparent display rate of the audio can be varied while maintaining proper pitch (i.e., the voices don't sound stupefied when the display is slowed down or like chipmunks when the display is speeded up) and, therefore, intelligibility. A brief description of a general method described therein is given immediately below, followed by a brief description of one particular method for modifying the audio data.

Generally, in the methods described in the above-mentioned patent application, a correspondence between an original audio data set and an original video data set is first established. For example, the number of audio samples that have the same duration as a frame of video data can be determined and that number of audio samples defined to be an audio segment. (Note that, as mentioned above, as used here in the description of skimming, "segment" refers to a contiguous portion of a set of audio data that occurs during a specified duration of time; elsewhere herein, "segment" refers to a contiguous related set of information within the primary or secondary information that typically concerns a single theme or subject and that can be delineated in some manner from adjacent information.) The audio segments can be defined, for example, so that each audio segment corresponds to a single particular video frame. A target display rate (which can be faster or slower than a normal display rate at which an audiovisual display system generates an audiovisual display from the unmodified, original sets of audio and video data) is also determined. The target display rate can be a single value which remains unchanged throughout the display or a sequence of values such that the target display rate changes during the display. The original audio data set is manipulated, based upon the target display rate and an evaluation of the original audio data set, to produce a modified audio data set. As described below, the modified audio data set is produced so that, generally, when the modified audio data set is used to generate an audio display, the audio display appears to be speeded up or slowed down by an amount that is approximately equal to the target display rate. The correspondence between the modified audio data set and the original audio data set, and the correspondence between the original audio data set and the original video data set, are used to create a correspondence between the modified audio data set and the original video data set, which, in turn, is used to delete video data from, or add video data to, as appropriate, the original video data set to create a modified video data set. Once the modified audio and video data sets have been created, an audiovisual display can be generated from those modified data sets by an audiovisual display system, or the modified audio and video data sets can be stored on a conventional data storage device for use in generating a display at a later time. The audio and video data of the modified audio and video data sets are processed at the same rate as before (i.e., when the original audio and video data sets were used to generate a display at the normal display rate) by the audiovisual display system. However, since the modified audio and video data sets (in the usual case) have a different amount (either more or less) of data than the original audio and video data sets, the apparent display rate of the audiovisual display generated from the modified audio and video data sets is different than the normal display rate. Further, since the modified video data set is created based upon the content of the modified audio data set and a correspondence between the modified audio data set and the original video data set, the modified video data set is synchronized (at least approximately and, possibly, exactly) with the modified audio data set and produces a display of the same or approximately the same duration.

The audio data can be modified in any suitable manner; one way is described following. An audio data set is divided into non-overlapping segments of equal length. Generally, the beginning and end of each segment are overlapped with the end and beginning, respectively, of adjacent segments. (Note that the overlap can be negative, such that the length of the adjacent segments is extended. The audio data of corresponding overlapped portions of adjacent segments are blended and replaced by the blended audio data. The possible lengths of each overlap are constrained in accordance with a target overlap that corresponds to the specified target display rate. However, within this constraint, the length of each particular overlap is chosen so that the pitch pulses of the overlapped portions closely resemble each other. Consequently, the blending of the audio data of the overlapped portions does not greatly distort the sound corresponding to the overlapped portions of audio data. Thus, the invention enables the audio data set to be condensed or expanded a desired amount (i.e., the display of an audio data

set can be speeded up or slowed down as desired), while minimizing the amount of distortion associated with the modification of the audio data set (i.e., the audio display sounds "normal").

Since the actual amount of overlap of segments can vary from the target overlap that corresponds to the specified target display rate, the actual apparent display rate can vary from the target display rate. Over relatively long periods of time (e.g., greater than approximately 0.5 seconds), the actual apparent display rate typically closely approximates the target display rate. Over shorter time periods (e.g., approximately 30 milliseconds), the actual apparent display rate can vary more substantially from the target display rate. However, these short term fluctuations are not perceptible to an observer. Thus, this method produces an actual apparent display rate that to an observer appears to faithfully track the target display rate over the entire range of the display.

Preferably, the computation required to produce a particular amount of variation in the apparent display rate is done at the time that the determination of a target display rate mandates such variation. This has the advantage of reducing the amount of data storage capacity required by a system of the invention. This also enables any magnitude of apparent display rate to be specified over a continuous range of allowed display rates, rather than restricting the magnitude of the apparent display rate to one of a set of discrete magnitudes within an allowed range, as would be necessary if all of the computations for each magnitude of apparent display rate were pre-computed. Additionally, this enables the apparent display rate of the display to be varied in real time.

2. Summarization

A system according to the invention can include another information presentation feature that enables the display of a primary segment or segments to be summarized. Summarization enables an observer to quickly get an overview of the content of a particular segment or segments of information. Summarization can be implemented by appropriately programming a digital computer to accomplish the functions of a summarization method. Generally, summarization can be accomplished using any appropriate method. As with skimming, discussed above, the particular method used will typically depend upon the type of the set of data (e.g., audio, video, text) that is directly modified to produce appropriately modified data for use in generating a summary display of the primary information. The method also preferably synchronizes the sets of data that are not modified directly with the set of data that is.

For example, text data that is part of, or derived from, audiovisual data that represents a primary segment can be summarized, and the corresponding audio and video data summarized based upon the text summary. One method of accomplishing such summarization is described in detail in the commonly owned, co-pending U.S. patent application entitled "Indirect Manipulation Of Data Using Temporally Related Data, With Particular Application To Manipulation Of Audio Or Audiovisual Data," by Emanuel E. Farber and Subutai Ahmad, attorney docket number I0359-991110, filed on the same day as the present application, the disclosure of which is incorporated by reference herein. A brief description of that method is given immediately below.

The text data of a set of audiovisual data represents a transcription of the spoken portion of the audio data and is temporally related to each of the audio and video data. The text data can be obtained in any appropriate manner, e.g., the text data can be pre-existing text data such as closed-caption data or subtitles, or the text data can be obtained by using any of a number of known speech recognition methods to analyze the audio data to produce the text data.

The text data is summarized using an appropriate summarization method. Generally, any text summarization method can be used; a particular example of a text summarization method that can be used with the invention is described in U.S. Pat. No. 5,384,703, issued to Withgott et al. on Jan. 24, 1995.

The unsummarized text data is aligned with the unsummarized audio data. If the text data has been obtained from the audio data using a speech recognition method, then the alignment of the unsummarized text data with the unsummarized audio data typically exists as a byproduct of the speech recognition method. Otherwise, alignment is accomplished in three steps. First, the unsummarized text data is evaluated to generate a corresponding linguistic transcription network (e.g., a network describing the set of possible phonetic transcriptions). Second, a feature analysis is performed on the audio samples comprising the unsummarized audio data set to create a set of audio feature data. Third, the linguistic transcription network is compared to the set of audio feature data (using Hidden Markov Models to describe the linguistic units of the linguistic transcription network in terms of audio features) to determine the linguistic transcription (from all of the possible linguistic transcriptions allowed by the linguistic transcription network) which best fits the set of audio feature data. As a result of this comparison, the audio features of the best fit linguistic transcription are correlated with audio features in the set of audio feature data. The audio features of the best fit linguistic transcription can also be correlated with the linguistic units of the linguistic transcription network. The linguistic units of the linguistic transcription network can, in turn, be correlated with the unsummarized text data. As a consequence of these correlations, an alignment of the unsummarized text data with the unsummarized audio data can be obtained. Using the previously determined text summary and the alignment between the text data and audio data, an audio summary can be produced.

A video summary can be produced from the audio summary using an alignment between the unsummarized audio data and the unsummarized video data. Such alignment can be pre-existing (because the audio data and video data were recorded together, the alignment being inherent because of the like time stamps associated with each of the audio and video data) or can be calculated easily (the time stamp for an audio sample or video frame can be calculated by multiplying the time duration of each sample or frame by the sequence number of the sample or frame within the audio data or video data).

Another method that can be used to summarize the display of a set of audiovisual information includes identifying and eliminating "sound bites" (defined below) in the audio portion of the primary information. The sound bites can be identified based upon analysis of a set of text data that corresponds to the spoken portion of the set of audio data. The text data can be obtained in any appropriate manner. For example, the text data may be closed caption data that is provided with the audio and video data representing the primary information. Or, the text data can be obtained from the set of audio data using conventional speech recognition techniques. Once the text data is obtained, the text data can be "pre-processed" using known methods to classify the words in the text data according to their characteristics, e.g., part of speech.

Herein, a "sound bite" is a related set of contiguous audio information that conforms to one or more predetermined

criteria that are intended to identify short spoken phrases that are not spoken by a previously identified primary speaker and that represent information of little interest and/or are redundant For example, in a news browser according to the invention, where the primary information includes the content of audiovisual news programs (e.g., television news programs), the predetermined criteria can be established so that spoken portions of the audio information that are likely not to have been spoken by a news anchorperson or a news reporter are identified as sound bites. Such criteria might include, for example, rules that tend to identify a spoken portion of the audio as a sound bite if the spoken portion includes slang words or the use of first person pronouns (e.g., I or we), both of which tend not to be present in the speech of an anchorperson or reporter. As can be appreciated, elimination of such audio portions will typically not significantly adversely affect the presentation of the essential content of a set of audio information, but will enable the set of audio information to be presented more quickly. (It should be noted that the summarization method of Withgott et al. was also found to be incidentally effective at eliminating sound bites.)

Once the audio data has been modified by eliminating the audio data corresponding to the sound bites, the set of modified audio data must be aligned (synchronized) with the video data (if present) to enable the video data to be modified to produce a speeded-up video display. As described above with respect to the summarization method of Farber and Ahmad, the audio/video alignment can either be pre-existing or calculated easily.

As can be appreciated, a summarization method such as one of those described above could be used in combination with a method for increasing the apparent display rate as described above (see section IV.C.1. above on Skimming) to even further condense the display of a set of primary information. For example, the set or sets of data representing the primary information could be modified to increase the apparent display rate, then the modified set or sets of data could be summarized to produce a speeded-up summary of the set of primary information. Or, conversely, the set or sets of data representing the primary information could be summarized, then the summarized set or sets of data modified to increase the apparent display rate, thus producing a speeded-up summary of the set of primary information.

As can be appreciated, the methods described above for manipulating audiovisual data to produce a summarized display of the audiovisual data can also be used, with appropriate modification (e.g., instead of producing a summary of the text data, the text data could be manipulated in some other desired fashion), to manipulate the audiovisual data for some other purpose, such as rearranging, editing, selectively accessing or searching the audiovisual data.

3. Display Pause with Elastic Playback

A system according to the invention can include yet another information presentation feature that enables the display of an image to be paused, then, at the end of the pause, resumed at an accelerated rate (i.e., a rate that is faster than a normal display rate) until a time at which the content of the display corresponds to the content that would have been displayed had the image been displayed at the normal display rate without the pause, at which time display of the image at the normal display rate resumes. In other words, after a pause, the image display is speeded up so that the display "catches up" to where it would have been without the pause, then slowed back down to the normal display rate. The implementation of this feature is described in detail in the commonly owned, co-pending U.S. patent application entitled "Display Pause with Elastic Playback," by Subutai Ahmad, Neal A. Bhadkamkar, Steve B. Cousins, Paul A. Freiberger and Brygg A. Ullmer, attorney docket number I0359-991150, filed on the same day as the present application, the disclosure of which is incorporated by reference herein. A brief description of the implementation is given immediately below.

The image to be displayed is represented by an ordered set of display data. This display data is acquired from a data source at a first rate. The display data is transferred to a display device at the first rate as the display data is acquired. An image is generated from the display data transferred to the display device and displayed on the display device. At some point, the user instructs the system to pause the display. The system identifies the pause instruction from the user and, in response, stops the transfer of display data to the display device and begins storing the acquired display data at the first rate. At some later time, the user instructs the system to resume the display. The system identifies the resume instruction from the user and, in response, begins transferring stored display data to the display device at a second, effective rate that is greater than the first rate. An image is generated from the stored display data transferred to the display device and displayed on the display device. While the stored display data is being transferred to the display device, the newly acquired data continues to be stored. The storage of display data finally stops when there is no more stored display data to be transferred to the display device, the amount of stored display data having gradually been reduced by transferral of the stored display data to the display device at the second, effective rate that is greater than the first rate at which the display data is stored. Once the storage of display data stops, the display data is again transferred to the display device at the first rate as the display data is acquired.

This feature of the invention enables a great deal of flexibility in observing a real-time display of audiovisual information. For example, the invention enables an observer to pause and resume the display as desired so that, if the observer wants to temporarily stop watching to go to the bathroom or to take a phone call, the observer can pause the display, then, after resuming the display upon return, watch the audiovisual information at an accelerated display rate until the display of the program catches up to where it would have been without the pause. Thus, the user can attend to other matters while the audiovisual information is being viewed, without sacrificing viewing any of the content of the audiovisual information or enduring the inconvenience of spending additional time to finish watching the audiovisual program. This feature of the invention can also be tailored to enable a user who has begun viewing the audiovisual information at a time later than desired, to observe the audiovisual information at an accelerated rate until the display catches up to the point at which the display have been if the audiovisual information had been viewed at a normal display rate beginning at the desired start time.

Various embodiments of the invention have been described. The descriptions are intended to be illustrative, not limitative. Thus, it will be apparent to one skilled in the art that certain modifications may be made to the invention as described without departing from the scope of the claims set out below.

We claim:

1. A system for acquiring and reviewing a body of information, wherein the body of information includes a plurality of segments, each segment representing a defined set of information in the body of information, the system comprising:

means for acquiring data representing the body of information;

means for storing the acquired data;

first display means for generating a display of a first segment of the body of information from data that is part of the stored data;

means for comparing data representing a segment of the body of information to data representing a different segment of the body of information to determine whether, according to one or more predetermined criteria, the compared segments are related; and

second display means for generating a display of a portion of, or a representation of, a second segment of the body of information from data that is part of the stored data, wherein the second display means displays the portion or representation of the second segment in response to the display by the first display means of a first segment to which the second segment is related.

2. A system as in claim **1**, wherein the second display means displays the portion or representation of the second segment substantially coextensive in time with the display of the related first segment by the first display means.

3. A system as in claim **1**, wherein:

at least a portion of the body of information is represented by audiovisual data;

the first segment is represented by audiovisual data;

the first display means displays an audiovisual display of the first segment; and

the second segment is represented by audiovisual data.

4. A system as in claim **3**, further comprising means for selecting a segment for which a portion or representation is displayed by the second display means, wherein selection of such segment causes the first display means to display an audiovisual display of the selected segment.

5. A system as in claim **1**, wherein:

at least a portion of the body of information is represented by audiovisual data;

the first display means displays an audiovisual display of the first segment; and

the second display means displays a text display of a portion or representation of the second segment.

6. A system as in claim **1**, wherein:

the first display means is an analog display device; and

the second display means is a digital display device.

7. A system as in claim **1**, wherein:

the first display means is a television; and

the second display means is a computer display monitor.

8. A system as in claim **1**, further comprising means for identifying the subject matter content of a segment of the body of information, wherein the means for comparing further comprises means for determining the similarity of the subject matter content of a segment to the subject matter content of a different segment, the predetermined criteria including a predefined degree of similarity with respect to which the relatedness of the compared segments is determined.

9. A system as in claim **8**, wherein the means for determining the similarity of the subject matter of segments further comprises means for performing a relevance feedback method.

10. A system as in claim **1**, wherein the means for acquiring data further comprises means for acquiring television broadcast signals.

11. A system as in claim **1**, wherein the means for acquiring data further comprises means for acquiring radio broadcast signals.

12. A system as in claim **1**, wherein the means for acquiring data further comprises means for acquiring computer-readable data files over a computer network from an information providing site that is part of that network.

13. A system as in claim **1**, wherein the means for acquiring data further comprises:

means for acquiring television broadcast signals; and

means for acquiring computer-readable data files over a computer network from an information providing site that is part of that network.

14. A system as in claim **13**, wherein:

the first segment is represented by data produced from the television broadcast signals; and

the second segment is represented by data from the computer-readable data files.

15. A system as in claim **1**, further comprising means for identifying an instruction from a user to begin displaying at least some of the body of information, wherein the first display means begins displaying a segment in response to the user instruction.

16. A system as in claim **1**, wherein the first and second display means are physically separate.

17. A system as in claim **1**, wherein the means for storing the acquired data, the first display means and the second display means are interconnected to a conventional computer bus that enables the devices to communicate with each other such that the devices do not require wire communication over network communication lines to communicate with each other.

18. A system as in claim **1**, wherein at least some of the acquired data is digital data, the means for acquiring data further comprising means for acquiring digital data.

19. A system as in claim **1**, wherein at least some of the acquired data is analog data, the means for acquiring data further comprising means for acquiring analog data.

20. A method for acquiring and reviewing a body of information, wherein the body of information includes a plurality of segments, each segment representing a defined set of information in the body of information, the method comprising the steps of:

acquiring data representing the body of information;

storing the acquired data;

generating a display of a first segment of the body of information from data that is part of the stored data;

comparing data representing a segment of the body of information to data representing a different segment of the body of information to determine whether, according to one or more predetermined criteria, the compared segments are related; and

generating a display of a portion of, or a representation of, a second segment of the body of information from data that is part of the stored data, wherein the display of the portion or representation of the second segment is generated in response to the display of a first segment to which the second segment is related.

21. A method as in claim **20**, further comprising the step of causing the display of the portion or representation of the second segment to occur substantially coextensive in time with the display of the related first segment.

22. A method as in claim **20**, wherein:

the step of acquiring data representing the body of information further comprises the step of acquiring audiovisual data representing at least a portion of the body of information, wherein the first and second segments are represented by audiovisual data; and

the step of generating a display of a first segment of the body of information further comprises the step of generating an audiovisual display of the first segment.

23. A method as in claim **22**, further comprising the step of identifying the selection of a second segment for which a portion or representation is being displayed, wherein selection of such second segment causes an audiovisual display of the selected second segment to be produced.

24. A method as in claim **20**, wherein:

the step of acquiring data representing the body of information further comprises the step of acquiring audiovisual data representing at least a portion of the body of information;

the step of generating a display of a first segment of the body of information further comprises the step of generating an audiovisual display of the first segment; and

the step of generating a display of a portion of, or a representation of, a second segment of the body of information further comprises the step of generating a text display of the portion or representation of the second segment.

25. A method as in claim **20**, wherein:

the step of generating a display of a first segment of the body of information further comprises the step of generating a display of the first segment on an analog display device; and

the step of generating a display of a portion of, or a representation of, a second segment of the body of information further comprises the step of generating a display of the portion or representation of the second segment on a digital display device.

26. A method as in claim **20**, wherein:

the step of generating a display of the first segment on an analog display device further comprises the step of generating a display of the first segment on a television; and

the step of generating a display of the portion or representation of the second segment on a digital display device further comprises the step of generating a display of the portion or representation of the second segment on a computer display monitor.

27. A method as in claim **20**, further comprising the step of identifying the subject matter content of a segment of the body of information, wherein the step of comparing further comprises the step of determining the similarity of the subject matter content of a segment to the subject matter content of a different segment, the predetermined criteria including a predefined degree of similarity with respect to which the relatedness of the compared segments is determined.

28. A method as in claim **27**, wherein the step of determining the similarity of the subject matter of segments further comprises the step of performing a relevance feedback method.

29. A method as in claim **20**, wherein the step of acquiring data further comprises the step of acquiring television broadcast signals.

30. A method as in claim **20**, wherein the step of acquiring data further comprises the step of acquiring radio broadcast signals.

31. A method as in claim **20**, wherein the step of acquiring data further comprises the step of acquiring computer-readable data files over a computer network from an information providing site that is part of that network.

32. A method as in claim **20**, wherein the step of acquiring data further comprises the steps of:

acquiring television broadcast signals; and

acquiring computer-readable data files over a computer network from an information providing site that is part of that network.

33. A method as in claim **32**, wherein:

the first segment is represented by data produced from the television broadcast signals; and

the second segment is represented by data from the computer-readable data files.

34. A method as in claim **20**, further comprising the step of identifying an instruction from a user to begin displaying at least some of the body of information, wherein the display of a first segment is begun in response to the user instruction.

35. A method as in claim **20**, wherein the first and second segments are displayed on physically separate display devices.

36. A method as in claim **20**, wherein the steps of storing the acquired data, generating a display of a first segment of the body of information, and generating a display of a portion of, or a representation of, a second segment of the body of information are performed by devices interconnected to a conventional computer bus that enables the devices to communicate with each other such that the devices do not require wire communication over network communication lines to communicate with each other.

37. A method as in claim **20**, wherein at least some of the acquired data is digital data, the step of acquiring data further comprising the step of acquiring digital data.

38. A method as in claim **20**, wherein at least some of the acquired data is analog data, the step of acquiring data further comprising the step of acquiring analog data.

39. A method for categorizing according to subject matter an uncategorized segment of a body of information that includes a plurality of segments, each segment representing a defined set of information in the body of information, one or more segments of the body of information having previously been categorized by identifying each of the one or more segments with one or more subject matter categories, the method comprising the steps of:

determining the degree of similarity between the subject matter content of the uncategorized segment and the subject matter content of each of the previously categorized segments;

identifying one or more of the previously categorized segments as relevant to the uncategorized segment based upon the determined degrees of similarity of subject matter content between the uncategorized segment and the previously categorized segments; and

selecting one or more subject matter categories with which to identify the uncategorized segment based upon the subject matter categories used to identify the relevant previously categorized segments.

40. A method as in claim **39**, wherein the step of determining the degree of similarity is accomplished using a relevance feedback method.

41. A method as in claim **39**, wherein the step of identifying one or more of the previously categorized segments as relevant to the uncategorized segment further comprises the steps of:

identifying a plurality of the previously categorized segments that are the most similar to the uncategorized segment;

determining the degree of similarity between each of the plurality of previously categorized segments and each other of the plurality of previously categorized segments;

for each pair of previously categorized segments of the plurality of previously categorized segments having greater than a predefined degree of similarity, eliminating one of the pair of previously categorized segments from the plurality of previously categorized segments, wherein the previously categorized segment or segments remaining after the step of eliminating are similar and distinct previously categorized segments; and

identifying one or more of the similar and distinct previously categorized segments as relevant previously categorized segments.

42. A method as in claim **39**, wherein the step of selecting one or more subject matter categories further comprises selecting the most frequently occurring subject matter category or categories associated with the relevant previously categorized segments.

43. A method as in claim **39**, wherein the uncategorized segment has been acquired from a first data source and the previously categorized segment or segments have been acquired from a second data source that is different than the first data source.

44. A method as in claim **43**, wherein:

the data acquired from the first data source are television or radio broadcast signals; and

the data acquired from the second data source are computer-readable data files.

45. A method for determining whether a first set of information represented by a set of data of a first type is relevant to a second set of information represented by a set of data of a second type, the first and second sets of information being different from each other, the method comprising the steps of:

deriving a set of data of the second type from the set of data of the first type, the derived set of data of the second type also being representative of the first set of information;

determining the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information; and

determining whether the first set of information is relevant to the second set of information based upon the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information.

46. A method as in claim **45**, wherein the first type of data is audiovisual data and the second type of data is text data.

47. A method as in claim **46**, wherein the step of determining the degree of similarity is accomplished using a relevance feedback method.

48. A method as in claim **45**, wherein a plurality of sets of information, each different from the other sets of the plurality of sets of information, are each represented by an associated set of data of the second type, the method enabling determination of which, if any, of the plurality of sets of information represented by a set of data of the second type are relevant to the first set of information represented by the set of data of the first type, the method further comprising the steps of:

determining the degree of similarity between each set of data of the second type representing one of the plurality of sets of information and the derived set of data of the second type representing the first set of information;

identifying which, if any, of the sets of data of the second type representing one of the plurality of sets of information have greater than a predefined degree of similarity to the derived set of data of the second type representing the first set of information, the sets of data of the second type so identified being termed similar sets of data of the second type;

determining the degree of similarity between each similar set of data of the second type and each other similar set of data of the second type;

for each pair of similar sets of data of the second type having greater than a predefined degree of similarity, eliminating one of the pair of similar sets of data of the second type from the set of similar sets of data of the second type, wherein the set or sets of similar data of the second type remaining after the step of eliminating are similar and distinct sets of data of the second type; and

identifying the set or sets of information corresponding to one or more of the similar and distinct sets of data of the second type as relevant to the second set of information.

49. A method as in claim **48**, wherein the step of identifying the relevant set or sets of information further comprises identifying no more than a predetermined number of relevant sets of information, the predetermined number of relevant sets of information corresponding to the sets of data of the second type having the greatest degree of similarity to the derived set of data of the second type.

50. A method as in claim **45**, wherein the first type of data is analog data and the second type of data is digital data.

51. A method for identifying the boundaries of segments in a body of information, each segment comprising a contiguous related set of information in the body of information, wherein the body of information is represented by at least a set of text data and a set of video data, the method comprising the steps of:

performing a coarse partitioning method, the coarse partitioning method further comprising the steps of:

identifying time-stamped markers in the set of text data; and

determining approximate segment boundaries within the body of information as the times of occurrence of the time-stamp markers;

for each approximate segment boundary, specifying a range of time that includes the time of occurrence of the approximate segment boundary;

extracting subsets of video data from the set of video data that occur during the specified ranges of time;

performing a fine partitioning method to identify one or more breaks in the set of video data; and

selecting the best break that occurs in each subset of video data, the time of occurrence of the best break in each subset being designated as a boundary of a segment in the body of information.

52. A method as in claim **51**, wherein the step of performing a fine partitioning method further comprises identifying the best breaks using a process that includes scene break identification.

53. A method as in claim **51**, wherein the step of fine partitioning is performed on the entire set of video data to identify all of the breaks in the set of video data.

54. A method as in claim **51**, wherein the step of fine partitioning is performed only on the subsets of video data to identify only breaks that occur in the subsets.

55. A method as in claim **51**, wherein the best break of each subset is determined according to the criteria of the fine partitioning method used.

56. A method as in claim 51, wherein the best break of each subset is the break occurring closest in time to the time of occurrence of the segment boundary in the text data that corresponds to that subset.

57. A method as in claim 51, wherein the body of information is represented by a set of text data, a set of audio data and a set of video data, the method further comprising the steps of:

ascertaining a synchronization of the audio data and the video data; and

determining the location of the segment boundaries in the set of audio data using the previously determined location of the segment boundaries in the set of video data and the synchronization of the audio data and video data.

58. A method for identifying the boundaries of segments in a body of information, each segment comprising a contiguous related set of information in the body of information, wherein the body of information is represented by a set of text data, a set of video data, and a set of audio data, the method comprising the steps of:

performing a coarse partitioning method, the coarse partitioning method further comprising the steps of:

identifying time-stamped markers in the set of text data; and

determining approximate segment boundaries within the body of information as the times of occurrence of the time-stamp markers;

for each approximate segment boundary, specifying a range of time that includes the time of occurrence of the approximate segment boundary;

extracting subsets of audio data from the set of audio data that occur during the specified ranges of time;

performing a fine partitioning method to identify one or more breaks in the set of audio data;

selecting the best break that occurs in each subset of audio data, the time of occurrence of the best break in each subset being designated as a boundary of a segment in the body of information;

ascertaining a synchronization of the audio data and the video data; and

determining the location of the segment boundaries in the set of video data using the previously determined location of the segment boundaries in the set of audio data and the synchronization of the audio data and video data.

59. A method as in claim 58, wherein the step of performing fine partitioning further comprises identifying the best breaks using a process that includes pause recognition.

60. A method as in claim 58, wherein the step of performing fine partitioning further comprises identifying the best breaks using a process that includes voice recognition.

61. A method as in claim 58, wherein the step of performing fine partitioning further comprises identifying the best breaks using a process that includes word recognition.

62. A method as in claim 58, wherein the step of performing fine partitioning further comprises identifying the best breaks using a process that includes music recognition.

63. A computer readable medium encoded with one or more computer programs for enabling acquisition and review of a body of information, wherein the body of information includes a plurality of segments, each segment representing a defined set of information in the body of information, comprising:

instructions for acquiring data representing the body of information;

instructions for storing the acquired data;

instructions for generating a display of a first segment of the body of information from data that is part of the stored data;

instructions for comparing data representing a segment of the body of information to data representing a different segment of the body of information to determine whether, according to one or more predetermined criteria, the compared segments are related; and

instructions for generating a display of a portion of, or a representation of, a second segment of the body of information from data that is part of the stored data, wherein the display of the portion or representation of the second segment is generated in response to the display of a first segment to which the second segment is related.

64. A computer readable medium as in claim 63, further comprising instructions for causing the display of the portion or representation of the second segment to occur substantially coextensive in time with the display of the related first segment.

65. A computer readable medium as in claim 63, wherein:

the instructions for acquiring data representing the body of information further comprise instructions for acquiring audiovisual data representing at least a portion of the body of information, wherein the first and second segments are represented by audiovisual data; and

the instructions for generating a display of a first segment of the body of information further comprise instruction for generating an audiovisual display of the first segment.

66. A computer readable medium as in claim 65, further comprising instructions for identifying the selection of a second segment for which a portion or representation is being displayed, wherein selection of such second segment causes an audiovisual display of the selected second segment to be produced.

67. A computer readable medium as in claim 63, wherein:

the instructions for acquiring data representing the body of information further comprise instructions for acquiring audiovisual data representing at least a portion of the body of information;

the instructions for generating a display of a first segment of the body of information further comprise instructions for generating an audiovisual display of the first segment; and

the instructions for generating a display of a portion of, or a representation of, a second segment of the body of information further comprise instructions for generating a text display of the portion or representation of the second segment.

68. A computer readable medium as in claim 63, wherein:

the instructions for generating a display of a first segment of the body of information further comprise instructions for generating a display of the first segment on an analog display device; and

the instructions for generating a display of a portion of, or a representation of, a second segment of the body of information further comprise instructions for generating a display of the portion or representation of the second segment on a digital display device.

69. A computer readable medium as in claim 63, wherein:

the instructions for generating a display of the first segment on an analog display device further comprise instructions for generating a display of the first segment on a television; and

the instructions for generating a display of the portion or representation of the second segment on a digital display device further comprise instructions for generating a display of the portion or representation of the second segment on a computer display monitor.

70. A computer readable medium as in claim **63**, further comprising instructions for identifying the subject matter content of a segment of the body of information, wherein the instructions for comparing further comprise instructions for determining the similarity of the subject matter content of a segment to the subject matter content of a different segment, the predetermined criteria including a predefined degree of similarity with respect to which the relatedness of the compared segments is determined.

71. A computer readable medium as in claim **70**, wherein the instructions for determining the similarity of the subject matter of segments further comprise instructions for performing a relevance feedback method.

72. A computer readable medium as in claim **63**, wherein the instructions for acquiring data further comprise instructions for acquiring television broadcast signals.

73. A computer readable medium as in claim **63**, wherein the instructions for acquiring data further comprise instructions for acquiring radio broadcast signals.

74. A computer readable medium as in claim **63**, wherein the instructions for acquiring data further comprise instructions for acquiring computer-readable data files over a computer network from an information providing site that is part of that network.

75. A computer readable medium as in claim **63**, wherein the instructions for acquiring data further comprise:

instructions for acquiring television broadcast signals; and

instructions for acquiring computer-readable data files over a computer network from an information providing site that is part of that network.

76. A computer readable medium as in claim **75**, wherein:

the first segment is represented by data produced from the television broadcast signals; and

the second segment is represented by data from the computer-readable data files.

77. A computer readable medium as in claim **63**, further comprising instructions for identifying an instruction from a user to begin displaying at least some of the body of information, wherein the display of a first segment is begun in response to the user instruction.

78. A computer readable medium as in claim **63**, wherein the first and second segments are displayed on physically separate display devices.

79. A computer readable medium as in claim **63**, wherein the instructions for storing the acquired data, generating a display of a first segment of the body of information, and generating a display of a portion of, or a representation of, a second segment of the body of information are executed by devices interconnected to a conventional computer bus that enables the devices to communicate with each other such that the devices do not require wire communication over network communication lines to communicate with each other.

80. A computer readable medium as in claim **63**, wherein at least some of the acquired data is digital data, the instructions for acquiring data further comprising instructions for acquiring digital data.

81. A computer readable medium as in claim **63**, wherein at least some of the acquired data is analog data, the instructions for acquiring data further comprising instructions for acquiring analog data.

82. A computer readable medium encoded with one or more computer programs for enabling categorization according to subject matter of an uncategorized segment of a body of information that includes a plurality of segments, each segment representing a defined set of information in the body of information, one or more segments having previously been categorized by identifying each of the one or more segments with one or more subject matter categories, comprising:

instructions for determining the degree of similarity between the subject matter content of the uncategorized segment and the subject matter content of each of the previously categorized segments;

instructions for identifying one or more of the previously categorized segments as relevant to the uncategorized segment based upon the determined degrees of similarity of subject matter content between the uncategorized segment and the previously categorized segments; and

instructions for selecting one or more subject matter categories with which to identify the uncategorized segment based upon the subject matter categories used to identify the relevant previously categorized segments.

83. A computer readable medium as in claim **82**, wherein the instructions for determining the degree of similarity further comprise instructions for performing a relevance feedback method.

84. A computer readable medium as in claim **82**, wherein the instructions for identifying one or more of the previously categorized segments as relevant to the uncategorized segment further comprise:

instructions for identifying a plurality of the previously categorized segments that are the most similar to the uncategorized segment;

instructions for determining the degree of similarity between each of the plurality of previously categorized segments and each other of the plurality of previously categorized segments;

instructions for eliminating, for each pair of previously categorized segments of the plurality of previously categorized segments having greater than a predefined degree of similarity, one of the pair of previously categorized segments from the plurality of previously categorized segments, wherein the remaining previously categorized segment or segments are similar and distinct previously categorized segments; and

instructions for identifying one or more of the similar and distinct previously categorized segments as relevant previously categorized segments.

85. A computer readable medium as in claim **82**, wherein the instructions for selecting one or more subject matter categories further comprise instructions for selecting the most frequently occurring subject matter category or categories associated with the relevant previously categorized segments.

86. A computer readable medium as in claim **82**, wherein the uncategorized segment has been acquired from a first data source and the previously categorized segment or segments have been acquired from a second data source that is different than the first data source.

87. A computer readable medium as in claim **86**, wherein:

the data acquired from the first data source are television or radio broadcast signals; and

the data acquired from the second data source are computer-readable data files.

88. A computer readable medium encoded with one or more computer programs for enabling determination of whether a first set of information represented by a set of data of a first type is relevant to a second set of information represented by a set of data of a second type, the first and second sets of information being different from each other, comprising:

instructions for deriving a set of data of the second type from the set of data of the first type, the derived set of data of the second type also being representative of the first set of information;

instructions for determining the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information; and

instructions for determining whether the first set of information is relevant to the second set of information based upon the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information.

89. A computer readable medium as in claim 88, wherein the first type of data is audiovisual data and the second type of data is text data.

90. A computer readable medium as in claim 89, wherein the instructions for determining the degree of similarity further comprise instructions for performing a relevance feedback method.

91. A computer readable medium as in claim 88, wherein a plurality of sets of information, each different from the other sets of the plurality of sets of information, are each represented by an associated set of data of the second type, the one or more computer programs enabling determination of which, if any, of the plurality of sets of information represented by a set of data of the second type are relevant to the first set of information represented by the set of data of the first type, the one or more computer programs further comprising:

instructions for determining the degree of similarity between each set of data of the second type representing one of the plurality of sets of information and the derived set of data of the second type representing the first set of information;

instructions for identifying which, if any, of the sets of data of the second type representing one of the plurality of sets of information have greater than a predefined degree of similarity to the derived set of data of the second type representing the first set of information, the sets of data of the second type so identified being termed similar sets of data of the second type;

instructions for determining the degree of similarity between each similar set of data of the second type and each other similar set of data of the second type;

instructions for eliminating, for each pair of similar sets of data of the second type having greater than a predefined degree of similarity, one of the pair of similar sets of data of the second type from the set of similar sets of data of the second type, wherein the remaining set or sets of similar data of the second type are similar and distinct sets of data of the second type; and

instructions for identifying the set or sets of information corresponding to one or more of the similar and distinct sets of data of the second type as relevant to the second set of information.

92. A computer readable medium as in claim 91, wherein the instructions for identifying the relevant set or sets of information further comprise instructions for identifying no more than a predetermined number of relevant sets of information, the predetermined number of relevant sets of information corresponding to the sets of data of the second type having the greatest degree of similarity to the derived set of data of the second type.

93. A computer readable medium as in claim 88, wherein the first type of data is analog data and the second type of data is digital data.

94. A computer readable medium encoded with one or more computer programs for enabling identification of the boundaries of segments in a body of information, each segment comprising a contiguous related set of information in the body of information, wherein the body of information is represented by at least a set of text data and a set of video data, comprising:

instructions for performing a coarse partitioning method, the coarse partitioning instructions further comprising:

instructions for identifying time-stamped markers in the set of text data; and

instructions for determining approximate segment boundaries within the body of information as the times of occurrence of the time-stamp markers;

instructions for specifying, for each approximate segment boundary, a range of time that includes the time of occurrence of the approximate segment boundary;

instructions for extracting subsets of video data from the set of video data that occur during the specified ranges of time;

instructions for performing a fine partitioning method to identify one or more breaks in the set of video data; and

instructions for selecting the best break that occurs in each subset of video data, the time of occurrence of the best break in each subset being designated as a boundary of a segment in the body of information.

95. A computer readable medium as in claim 94, wherein the instructions for performing a fine partitioning method further comprise instructions for identifying the best breaks using a process that includes scene break identification.

96. A computer readable medium as in claim 94, wherein the fine partitioning method is performed on the entire set of video data to identify all of the breaks in the set of video data.

97. A computer readable medium as in claim 94, wherein the fine partitioning method is performed only on the subsets of video data to identify only breaks that occur in the subsets.

98. A computer readable medium as in claim 94, wherein the best break of each subset is determined according to the criteria of the fine partitioning method used.

99. A computer readable medium as in claim 94, wherein the best break of each subset is the break occurring closest in time to the time of occurrence of the segment boundary in the text data that corresponds to that subset.

100. A computer readable medium as in claim 94, wherein the body of information is represented by a set of text data, a set of audio data and a set of video data, the one or more computer programs further comprising:

instructions for ascertaining a synchronization of the audio data and the video data; and

instructions for determining the location of the segment boundaries in the set of audio data using the previously determined location of the segment boundaries in the set of video data and the synchronization of the audio data and video data.

101. A system for categorizing according to subject matter an uncategorized segment of a body of information that

includes a plurality of segments, each segment representing a defined set of information in the body of information, one or more segments of the body of information having previously been categorized by identifying each of the one or more segments with one or more subject matter categories, the system comprising:

means for determining the degree of similarity between the subject matter content of the uncategorized segment and the subject matter content of each of the previously categorized segments;

means for identifying one or more of the previously categorized segments as relevant to the uncategorized segment based upon the determined degrees of similarity of subject matter content between the uncategorized segment and the previously categorized segments; and

means for selecting one or more subject matter categories with which to identify the uncategorized segment based upon the subject matter categories used to identify the relevant previously categorized segments.

102. A system as in claim **101**, wherein the means for determining the degree of similarity further comprises means for performing a relevance feedback method.

103. A system as in claim **101**, wherein the means for identifying one or more of the previously categorized segments as relevant to the uncategorized segment further comprises:

means for identifying a plurality of the previously categorized segments that are the most similar to the uncategorized segment;

means for determining the degree of similarity between each of the plurality of previously categorized segments and each other of the plurality of previously categorized segments;

means for eliminating, for each pair of previously categorized segments of the plurality of previously categorized segments having greater than a predefined degree of similarity, one of the pair of previously categorized segments from the plurality of previously categorized segments, wherein the remaining previously categorized segment or segments are similar and distinct previously categorized segments; and

means for identifying one or more of the similar and distinct previously categorized segments as relevant previously categorized segments.

104. A system as in claim **101**, wherein the means for selecting one or more subject matter categories further comprises means for selecting the most frequently occurring subject matter category or categories associated with the relevant previously categorized segments.

105. A system as in claim **101**, wherein the uncategorized segment has been acquired from a first data source and the previously categorized segment or segments have been acquired from a second data source that is different than the first data source.

106. A system as in claim **105**, wherein:

the data acquired from the first data source are television or radio broadcast signals; and

the data acquired from the second data source are computer-readable data files.

107. A system for determining whether a first set of information represented by a set of data of a first type is relevant to a second set of information represented by a set of data of a second type, the first and second sets of information being different from each other, the system comprising:

means for deriving a set of data of the second type from the set of data of the first type, the derived set of data of the second type also being representative of the first set of information;

means for determining the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information; and

means for determining whether the first set of information is relevant to the second set of information based upon the degree of similarity between the set of data of the second type representing the second set of information and the derived set of data of the second type representing the first set of information.

108. A system as in claim **107**, wherein the first type of data is audiovisual data and the second type of data is text data.

109. A system as in claim **108**, wherein the means for determining the degree of similarity further comprises means for performing a relevance feedback method.

110. A system as in claim **107**, wherein a plurality of sets of information, each different from the other sets of the plurality of sets of information, are each represented by an associated set of data of the second type, the system enabling determination of which, if any, of the plurality of sets of information represented by a set of data of the second type are relevant to the first set of information represented by the set of data of the first type, the system further comprising:

means for determining the degree of similarity between each set of data of the second type representing one of the plurality of sets of information and the derived set of data of the second type representing the first set of information;

means for identifying which, if any, of the sets of data of the second type representing one of the plurality of sets of information have greater than a predefined degree of similarity to the derived set of data of the second type representing the first set of information, the sets of data of the second type so identified being termed similar sets of data of the second type;

means for determining the degree of similarity between each similar set of data of the second type and each other similar set of data of the second type;

means for eliminating, for each pair of similar sets of data of the second type having greater than a predefined degree of similarity, one of the pair of similar sets of data of the second type from the set of similar sets of data of the second type, wherein the remaining set or sets of similar data of the second type are similar and distinct sets of data of the second type; and

means for identifying the set or sets of information corresponding to one or more of the similar and distinct sets of data of the second type as relevant to the second set of information.

111. A system as in claim **110**, wherein the means for identifying the relevant set or sets of information further comprises means for identifying no more than a predetermined number of relevant sets of information, the predetermined number of relevant sets of information corresponding to the sets of data of the second type having the greatest degree of similarity to the derived set of data of the second type.

112. A system as in claim **107**, wherein the first type of data is analog data and the second type of data is digital data.

113. A computer readable medium encoded with one or more computer programs for identifying the boundaries of

segments in a body of information, each segment comprising a contiguous related set of information in the body of information, wherein the body of information is represented by a set of text data, a set of video data, and a set of audio data, comprising:

instructions for performing a coarse partitioning method, the instructions for performing a coarse partitioning method further comprising:

instructions for identifying time-stamped markers in the set of text data; and

instructions for determining approximate segment boundaries within the body of information as the times of occurrence of the time-stamp markers;

instructions for specifying, for each approximate segment boundary, a range of time that includes the time of occurrence of the approximate segment boundary;

instructions for extracting subsets of audio data from the set of audio data that occur during the specified ranges of time;

instructions for performing a fine partitioning method to identify one or more breaks in the set of audio data;

instructions for selecting the best break that occurs in each subset of audio data, the time of occurrence of the best break in each subset being designated as a boundary of a segment in the body of information;

instructions for ascertaining a synchronization of the audio data and the video data; and

instructions for determining the location of the segment boundaries in the set of video data using the previously determined location of the segment boundaries in the set of audio data and the synchronization of the audio data and video data.

114. A computer readable medium as in claim **113**, wherein the instructions for performing fine partitioning further comprise instructions for identifying the best breaks using a process that includes pause recognition.

115. A computer readable medium as in claim **113**, wherein the instructions for performing fine partitioning further comprise instructions for identifying the best breaks using a process that includes voice recognition.

116. A computer readable medium as in claim **113**, wherein the instructions for performing fine partitioning further comprise instructions for identifying the best breaks using a process that includes word recognition.

117. A computer readable medium as in claim **113**, wherein the instructions for performing fine partitioning further comprise instructions for identifying the best breaks using a process that includes music recognition.

118. A system for identifying the boundaries of segments in a body of information, each segment comprising a contiguous related set of information in the body of information, wherein the body of information is represented by at least a set of text data and a set of video data, the system comprising:

means for performing a coarse partitioning method, the means for performing a coarse partitioning method further comprising:

means for identifying time-stamped markers in the set of text data; and

means for determining approximate segment boundaries within the body of information as the times of occurrence of the time-stamp markers;

means for specifying, for each approximate segment boundary, a range of time that includes the time of occurrence of the approximate segment boundary;

means for extracting subsets of video data from the set of video data that occur during the specified ranges of time;

means for performing a fine partitioning method to identify one or more breaks in the set of video data; and

means for selecting the best break that occurs in each subset of video data, the time of occurrence of the best break in each subset being designated as a boundary of a segment in the body of information.

119. A system as in claim **118**, wherein the means for performing a fine partitioning method further comprises means for identifying the best breaks using a process that includes scene break identification.

120. A system as in claim **118**, wherein the fine partitioning method is performed on the entire set of video data to identify all of the breaks in the set of video data.

121. A system as in claim **118**, wherein the fine partitioning method is performed only on the subsets of video data to identify only breaks that occur in the subsets.

122. A system as in claim **118**, wherein the best break of each subset is determined according to the criteria of the fine partitioning method used.

123. A system as in claim **118**, wherein the best break of each subset is the break occurring closest in time to the time of occurrence of the segment boundary in the text data that corresponds to that subset.

124. A system as in claim **118**, wherein the body of information is represented by a set of text data, a set of audio data and a set of video data, the system further comprising:

means for ascertaining a synchronization of the audio data and the video data; and

means for determining the location of the segment boundaries in the set of audio data using the previously determined location of the segment boundaries in the set of video data and the synchronization of the audio data and video data.

125. A system for identifying the boundaries of segments in a body of information, each segment comprising a contiguous related set of information in the body of information, wherein the body of information is represented by a set of text data, a set of video data, and a set of audio data, the system comprising:

means for performing a coarse partitioning method, the means for performing a coarse partitioning method further comprising:

means for identifying time-stamped markers in the set of text data; and

means for determining approximate segment boundaries within the body of information as the times of occurrence of the time-stamp markers;

means for specifying, for each approximate segment boundary, a range of time that includes the time of occurrence of the approximate segment boundary;

means for extracting subsets of audio data from the set of audio data that occur during the specified ranges of time;

means for performing a fine partitioning method to identify one or more breaks in the set of audio data;

means for selecting the best break that occurs in each subset of audio data, the time of occurrence of the best break in each subset being designated as a boundary of a segment in the body of information;

means for ascertaining a synchronization of the audio data and the video data; and

means for determining the location of the segment boundaries in the set of video data using the previously determined location of the segment boundaries in the set of audio data and the synchronization of the audio data and video data.

126. A system as in claim 125, wherein the means for performing a fine partitioning method further comprises means for identifying the best breaks using a process that includes pause recognition.

127. A system as in claim 125, wherein the means for performing a fine partitioning method further comprises means for identifying the best breaks using a process that includes voice recognition.

128. A system as in claim 125, wherein the means for performing a fine partitioning method further comprises means for identifying the best breaks using a process that includes word recognition.

129. A system as in claim 125, wherein the means for performing a fine partitioning method further comprises means for identifying the best breaks using a process that includes music recognition.

* * * * *

United States Court of Appeals
for the Federal Circuit
In re: Interval Licensing LLC, 2014-1775

CERTIFICATE OF SERVICE

I, Robyn Cocho, being duly sworn according to law and being over the age of 18, upon my oath depose and say that:

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On **November 10, 2014** counsel for Appellant has authorized me to electronically file the foregoing **Brief for Appellant** with the Clerk of Court using the CM/ECF System, which will serve via e-mail notice of such filing to all counsel registered as CM/ECF users, including any of the following:

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